SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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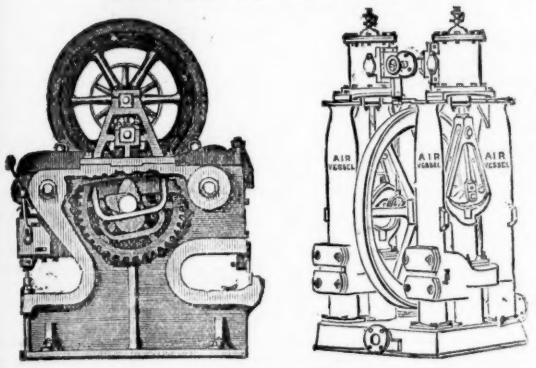

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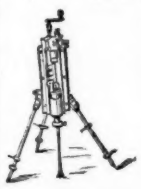

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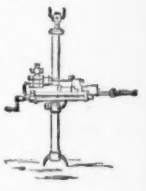

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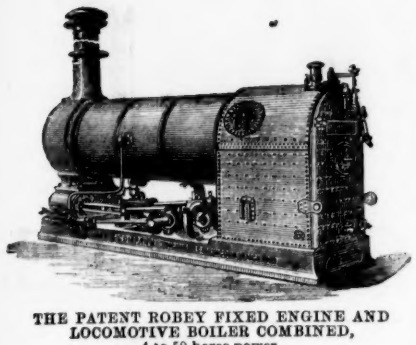

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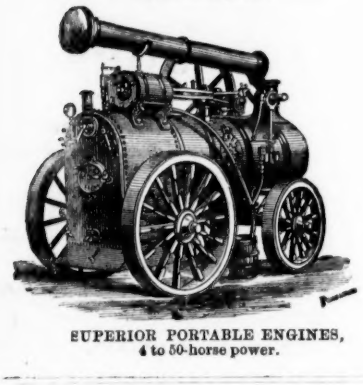

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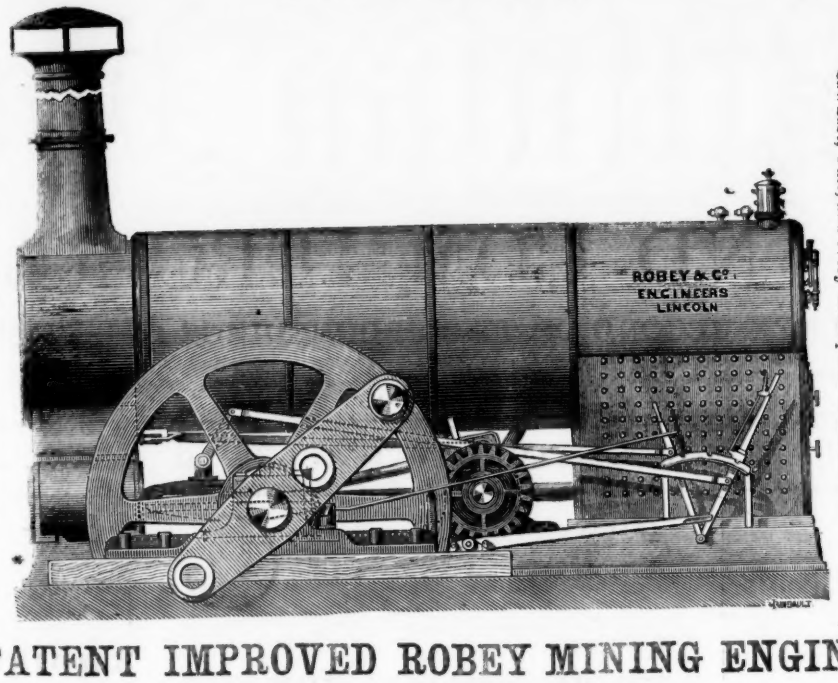

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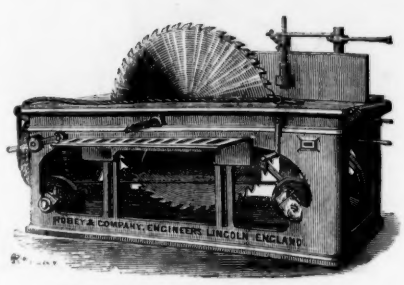

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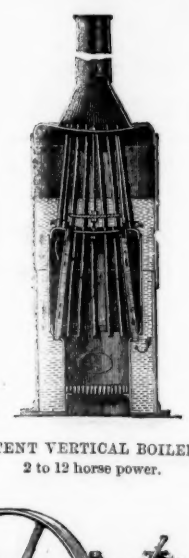

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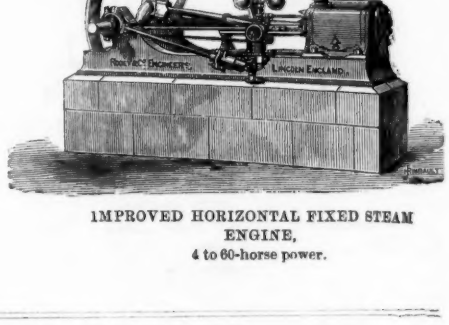

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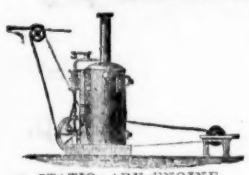

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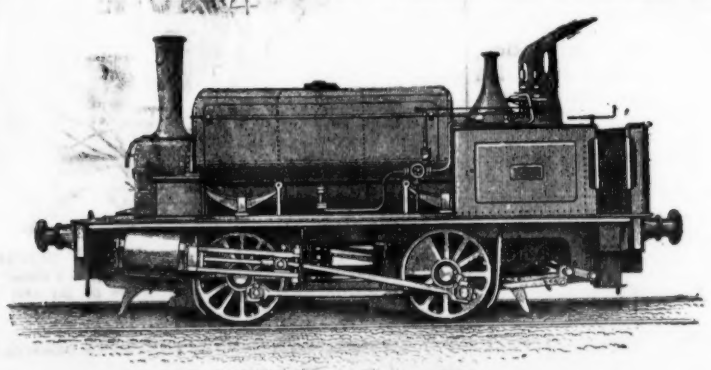

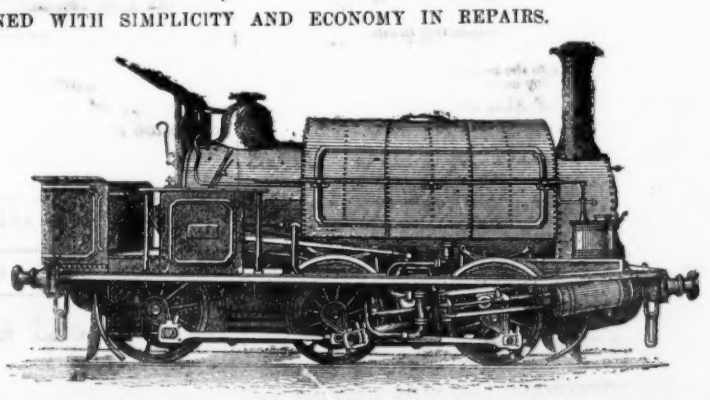

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PRICES AND SPECIFICATIONS ON APPLICATION.

Original Correspondence.

COAL-CUTTING MACHINES.

Sir,—The tendency of the present age is to substitute machinery for hand labour in getting coal, and hauling machinery for horse power in bringing that coal to the bottom of the pits, from whence it is raised (from great depths in many cases) to the surface by the most approved and powerful machinery. Since the introduction of a coal cutter by Menzies in the year 1761, various forms of these machines have been tried in our coal mines, but their application to coal cutting has not by any means become general. The advantage of opening out a mine quickly from the bottom of a pit, and the quick removal of coal at the faces of work is so manifest that there is no doubt machines will in time be perfected, as far as that can be done, and their use become general. In some mines the pressure of the roof is sufficient of itself to bring down the coal without undercutting, but in the majority of mines it is otherwise, and coal-cutters now are advantageously used in undercutting thick and thin seams, more particularly the latter, where the production of as much large coal as possible is the principal element in the working of the seam, the difference in price between large and small coal being 4s. or more per ton; the adoption of the coal-cutter, therefore, comes in to advantage, and it is thus possible to work the thin seam to profit, which could not be done by ordinary means—reducing the proportion of small coal probably from one-third to one-sixth or less of the whole.

The principal hindrance to the general adoption of coal-cutters is the expensive plant required to inaugurate the system, more especially in old-established collieries. If the system could be simplified so as to dispense with part of the compressing machinery and pipes we should see them come into general use. The irregularities of the strata in coal mines, particularly the roof, have also to be contended with, but the rapid working out of the coal is always favourable to the maintaining of the roof: the undercut is made, and the coal taken away before the weight of the roof comes on; this is manifestly an advantage in favour of coal-cutting machines.

In the pick action by hand labour a large part of the power is expended on the back stoke of the pick and in keeping it level, by turning a winch handle more than twice the power is developed; it would seem that a wheel cutter actuated by this method by hand would be more effective than the pick action.

Messrs. Firth, of Leeds, were almost the first in the field with a pick machine; these machines, it is believed, are still in operation, and doing good work at the West Ardsley Colliery, near Leeds. At Hetton Colliery, Durham, several varieties of coal cutters have been tried, the first being Firth's pick machine, afterwards Gillett and Copley's, then Baird's Gartsherrie machine; at present the patented machine of Rigg and Meiklejon is in operation, and doing good work.

A coal cutter, driven by hydraulic power, was tried at Kippax Colliery, near Leeds, in 1864, in the Haigh Moor seam, which has a thickness of 5 ft. 6 in., including a band of shale 2 in. thick, occurring at 20 in. from the bottom of the seam; in this shale the holing was made, so that practically scarcely any small coal was produced. The pressure at the machine varied from 150 to 300 lbs. to a square inch. The average rate of undercutting was 10 yards per hour, and the maximum rate 13 yards per hour. The depth of holing was 4 ft. and 3 in. high, The action of this machine consisted in the thrust of three chisels, each 16 in. long, one a little behind the other; these took out a slice at each stroke of the engine. To enable the thrust to be made the machine was kept in position by another piston and cylinder, and a "holder" forced against the roof; after the stroke or thrust was made the "holder" was released, in order to advance the machine a little for another thrust.

The machine of Hurd and Simpson does 15 times the work of a man, undercutting 30 yards per hour in medium coal, and 20 yards per hour including stoppages. Compressed air used at 20 lbs. pressure; with 50 lbs. pressure the amount of holing is about double what is stated above. The undercut is 3 in. high and 3 ft. in width. The machine patented by Winstanley and Barker has been a long time in use in a seam of coal 2 ft. 4 in. high. The weight of it is 15 cwts.; its height 22 in.; the pressure of air used is from 20 to 30 lbs. This machine undercuts 25 yards per hour, including stoppages, 3 ft. in width 3 in. high, doing the work of 25 or more colliers. The gain in large coal in the thin seam is 20 per cent. as compared with hand labour. Three men are required to one machine as attendants. Above 40 of these machines are in operation.

Gillett and Copley's machine is similar in principle to the two foregoing ones. The wheel in each variety has cutters or picks attached to it, which, being made to rotate quickly, act in a sense somewhat in imitation of the common pick; the miner with his pick by a series of percussive strokes directs the blows so as to produce the greatest effect. The wheel cutter may be considered to have a percussive action, resembling that of a series of picks.

The Gartsherrie machine has a scraping action on the coal in the act of undercutting. The cutters in this machine are attached to an endless chain, which is made to revolve with them. The machine stands from 20 in. to 24 in. high, air compressed to 35 or 40 lbs. per square inch. It undercuts 100 yards in a shift of nine hours, or 11 yards per hour, the cut being 2 ft. 9 in., and 2½ in. high. Two men and one boy act as attendants to one machine.

The patented machine of Rigg and Meiklejon is at present in operation at Hetton Colliery; it stands 15 in. high from the rail, and weighs 25 cwts. The average work done by the machine at Hetton is 29 yards per hour undercutting, 3 in. high, and 3 ft. 2 in. into the coal.

At Penston Colliery, in Haddington, one of these machines has been at work about 18 months in a seam varying from 22 to 30 ins. in thickness. The coal is hard, and is worked on the long-wall principle in a face of about 200 yards in length. The average of one month's work in this mine is 130 yards per shift of nine hours, inclusive of stoppages, or 14½ yards per hour. The undercut is 3 in. high, 3 ft. into the coal, and close to the floor of the seam. The maximum speed of undercutting is stated to be 60 yards per hour. This latter statement is probably meant to apply to a seam of coal where the holing is easy, and not to the seam at Penston Colliery above named.

If 60 yards per hour of undercutting can be performed in a coal of medium hardness, we cannot but consider this as the most efficient machine yet introduced, and as it is not complex in its arrangement, but rather more simple than is usual with wheel machines, there is little doubt that it will become more generally known. This brief summary of the work done by some of the principal coal-cutting machines will, we hope, lead to further enquiry into the subject. If so much work can be done by one machine our views on this subject will be modified, so much so as to induce us to invest in air-compressing machinery and the material required to set to work the coal-cutters: When we add that by the system of long-wall working the coal workings are more concentrated, the ventilation is simplified, and the air is cooled and purified by the machine itself in the proper place, we think enough has been said to commend the system as a whole for our adoption. M. E.

THE LONDON COAL SUPPLY.

Sir,—The Report from Derbyshire and Yorkshire, in last week's Journal, states—"Were the sacks left out of the question, the scheme would meet with considerable support; the coal owners could not fill and weigh the sacks at the pits." This is not the first time I have had to explain that it was never contemplated to convey the coal by rail, otherwise than as usual, in bulk. No sane person would propose to fill the sacks at the pits. Such a preposterous report emanates, no doubt, from interested parties, but the march of progress will not be impeded by such artifices. On the arrival of the wagons at Boston they will be emptied, a process which may be seen daily at the Great Northern and Midland metropolitan terminii into shoots provided as in London with screens, and the sacks filled by the employees of the company exactly as precited, the cost of which, to the extent of 72 men in constant employment, is included in the freight calculation. The sacks will be the usual sized London coal sacks; if anything larger, so that the consumer will be sure of getting his weight, and not, as stated in the Times and Standard of last Friday, paying for 6 tons, and only receiving 4½ and at a comparatively recent date having a short weight of 12 tons in each barge load. The Yorkshire, Derbyshire, and Notts coal owners have an enviable future for their output assured to them through their geographical proximity to London, as compared with Durham and Northumberland. William Joseph Thompson.

6, *Fitzwilliam-road, Clapham, Oct.* 16.

GREAT NORTHERN RAILWAY.

Sir,—Permit me to submit to the serious consideration of the investing public the "super abyssum ambulans" state of precited undertaking, basing my proofs on the 1878 Returns of the Board of Trade, and upon the admission of that Department that it is quite opposed to the spirit of the Great Northern concession to compete, by their low rates of conveyance, with the sea-borne coal traffic, which they publicly stated was impracticable, as per the evidence of their General Manager, who stated on April 11 last to a Committee of the House of Commons—"He was convinced railways would never compete with shipping;" culminating in incalculable detriment to the public and shareholders. The 1849 Committee of the House of Lords recommended separate accounts to be kept of separate branches, and the creation of a reserve fund, which has not been carried out. The Great Northern are charging enormously high rates to the working classes as compared with the toll levied on coal to the Metropolis, weight for weight, augmenting to an incalculable extent the deplorable condition of thousands of the unemployed workmen. The German, who possesses much lower rates of railway conveyance than the British handicraftsman, is thereby enabled from the remotest corners of "Vaterland" to invade the British labour market, to the great prejudice of our indigenous masons, engineers, bakers, &c, who contribute permanently to the taxation of the country, being fixed to the soil. The national working classes demand that the cost of conveyance of passengers, minerals, merchandise, and live stock be equitably and equally apportioned per ton weight, correctly worked-out net receipts, in conformity with precited report of the Lords' Committee.

A mercantile firm importing tea, coffee, and sugar keep separate ledger accounts. If they did not, anyone versed in mercantile affairs would not hesitate, without a moment's deliberation, to construe such a system as foreshadowing impending bankruptcy. The working classes are now preparing an appeal to Parliament to put a stop to this system, which will be supported by employers, shipowners, &c. Sir Edward Watkin, who is looked up to as a practical authority in railway administration, receives for Manchester, Sheffield, and Lincolnshire transit of coal to the Metropolis 1d. per ton per mile; whilst the Great Northern, endeavouring to annihilate the sea-borne traffic, which they could not effect in 1871, when, as per the Times City Article, they and the Midland were losing at the rate of 300,000*l.* a year on their London coal traffic, are actually carrying the identical coal at less than a moiety of that amount. Fraser's Magazine of this month, in "The Progress of some of our Railways towards Bankruptcy," shows the appalling condition of such management.

The *Mining Journal* Correspondence shows coal will, within a proximate period, be delivered from the pits' mouth in Yorkshire, Derbyshire, and Notts, *via* Boston, at 5s. a ton under the Great Northern Railway rate and attendant expenses to London. With your indulgence, I shall adduce elaborate corroborative data, and show the mockery of an audit of railway accounts, without a thorough technical knowledge to check the initial entries, the other part of book-keeping being a merely mechanical process.

William Joseph Thompson.

6, *Fitzwilliam-road, Clapham, Oct.* 17.

VOLLEY BLASTING.

Sir,—The necessity which exists in connection with the application of rock-boring machinery to fire shot holes in vollies of varying numbers has brought into the field of operation a danger to life and limb unless the miner will carefully guard himself against it. Shot holes, grouped, charged, and fired together may not always completely explode. Occasionally a charge may not explode, or only partially do so; in such a case the ground around the hole may not be entirely removed, and a portion of the explosive used remains behind in the "stump" of the hole, perhaps covered with dirt, hidden, as it were, from the eyes of the workmen. During the next boring shift the drill may, perchance, be angled towards such stump hole, when by the concurrent action of a spark and a blow an explosion will occur. The cause of the non-explosion of the whole or part of the explosion may be due to one of many circumstances—the fuse may be defective, a detonator may have its firing composition damp or wet, the detonator in itself may not be powerful enough to dispose of the charge, the different materials which constitute the explosive may not be well incorporated with each other. Safety to life and limb will, however, be materially increased if the miner will use in a plastic condition well made dynamite detonators, dry, of sufficient strength to ensure the complete detonation of the charge, and above all, if he will carefully search for and withdraw from a stump hole any explosive it may happen to contain.

Oct. 14. John Darlington.

ELECTRIC BLASTING.

Sir,—I am invited in last week's Journal to give my experience relative to the above method of blasting. Having been practically acquainted with the subject for about 18 months, and paid very careful attention to it, I may state that I consider the great advantages gained by mechanical boring are considerably neutralised unless firing by electricity is adopted. The latter invention is a fit and necessary concomitant of the former.

Let me briefly enumerate its advantages over the old system of blasting:—

1.—*It economises time.* This it does more by reducing the number of blasts, or distinct periods of firing operations, than by rapidity of firing, as the time taken to complete the circuit must be taken into account. With reliable fuses all the shot-holes in a shaft or end may be exposed advantageously in twice. Here we are obliged to to make three firings:—*a*, takes out the centre cut; *b*, sole, roof, and country side; *c*, the lode, which containing ore has to be broken down separately. Under other conditions it would be accomplished in two blasts. If the ordinary safety fuse were employed the same results could only be obtained for four or five distinct operations, each consuming increasing time for removal of gas.

2.—*It is more certain.* The best safety-fuse manufactured (we have had very good from Germany) will not ensure the holes going off, especially in wet ground. The insecure and frequently faulty mode of fastening on the detonator, and its liability to get wet in spite of every precaution, reduces the chances of its exploding to such a degree as to make it a very unsatisfactory and uncertain method of blasting.

3.—*It is more effective.* This is ably pointed out by Mr. André in last week's Journal. A moment's reflection shows that a group of holes ignited simultaneously must have more power in disintegrating a mass of rock than if fired singly. Each hole helps its nearest neighbour, and the whole shock of the explosion is communicated at the same moment. We have had ocular demonstration of this on several occasions when we have been out of electric fuses—holes have had to be fired two and three times which would have borne their burden if they had been assisted by the simultaneous action of the other holes.

4.—*It is cheaper.* Not at first cost, because a length of fuse and detonator can be obtained at a less price than an electric fuse; but, for reasons just assigned, it will accomplish the same work with a proportionately less number of holes—thus saving expense of boring, explosives, and fuses.

5.—*It is safer.* A desideratum that will appear of vital importance when the chronicles of accidents through safety fuse is perused. The dangers attached to fuse firing are so great that the most stringent governmental rules are enforced where it is used, and even these frequently supplemented in well-conducted concerns by still stricter regulations.

There may be through imperfect electric fuses and other unforseen causes "misfires;" but there never can be that fatally dangerous trick of safety fuse, "hang-fires," in blasting by electricity. Disconnect the cable from the exploder, and the men can go to the missed holes and discover the fault, with an absolute sense of security. Of late we have had a series of sad accidents through unexploded cartridges—notably the recent one at Carn Brea Mine. It would be interesting to know what method of blasting has been in vogue at these places.

From careful observation I am convinced that there is far less likelihood of finding unexploded dynamite after electric fuses than safety fuse. In firing a number of holes with the latter an intermittent action of the explosive is unavoidable, and thus whole charges in adjoining holes may be cut off from the safety fuse, and mixed with the debris. It may be argued that precisely the same thing may happen with a poor electric fuse; but this is less likely, because the concussion consequent upon the simultaneous explosion of several holes, if closely grouped, is sometimes sufficient to explode a charge though the cap misfires. We have frequently found this to be the case.

This letter having exceeded the limits I intended I must briefly state that, having tried several kinds of electric fuses, we find Bornhardt's much the best. They are neatly made, well protected from wet, and thoroughly reliable in groups of 10 and 12; beyond this, with our small machines, we cannot safely go. High tension electric fuses are undoubtedly the best for the miner's use.

We have two blasting machines—a Brain's low tension, and a Bornhardt's high tension. Both are used alternately with equally satisfactory results. Brain's machine is exceedingly portable and compact, but liable to derangement unless carefully handled. Bornhardt's is also portable, and thoroughly simple in its construction, and stands an amount of rough usage without deterioration that renders it a most useful machine for underground work. It can also be cleaned on the spot, whereas Brain's, being hermetically sealed, must be returned to the makers. John Barkell.

Isle of Man, Oct. 16.

P.S.—Being absent from home last week I did not read my letter you published until Saturday last. Kindly make this correction—the price for machines is 7*l.* 10s.; a honest hand price 11*l.* 10s.

J. B.

ELECTRIC ILLUMINATION—THE JABLOCHKOFF LIGHT.

Sir,—That the purity and brilliancy of the electric light far surpasses that of gas or any other kind of artificial light must be admitted by all who had an opportunity of comparing them; but the result of my investigation of the matter is that enormous improvements have still to be made both in the generators and candles before there can be the smallest probability of electricity superseding gas. The Gramme machine, which is relied upon for the generation of the electricity, is very far from perfect, as may be judged of from its having been tested, and after a long and patient trial condemned and abandoned, by the English Post Office authorities, and has, I believe, been equally condemned by the French savans as altogether wrong in principle. Notwithstanding all that has been asserted to the contrary, I am assured by those who are actually engaged about the machines that 1-horse power per Jablochkoff candle will not give a light at all, and that in ordinary practice not less than 1½-horse power per candle is used, and that not unfrequently 2-horse power per candle must be employed. In saying this I am speaking of the Gramme machine of 1878, and not of the earlier made ones, which those interested in allege to have been less perfect. If my memory serves me, the electric lights in the Avenue de l'Opera are placed on every alternate lamp-post; and I really do not see how they could in general practice be placed at a greater distance apart than they are in that street, because although I admit that there is 20 times the light in the street that would be obtained from the gas lights, the effect, if the electric lights were placed much further apart, would be to produce an alternation of light and darkness, which would render the immediate abandonment of the Jablochkoff system inevitable.

In reporting the experiments at Messrs. Wells and Co.'s works, in last week's Journal, there has evidently been a desire on the part of the reporter to gloze over the defects, or it would have been honestly stated that the experiments were a failure, that the lights could not be maintained for more than half-an-hour, and that this defect was clearly attributable to the Gramme machine, or to that machine being run with two little power; for I observed that, first, the two lamps outside the shop went out, and that some minutes afterwards the inside lamps dried off one by one, and the reliable old gas had to be relighted. Your reporter states that the lamps were extinguished in order to show other experiments inside. This, I think, is an error, as the two managers of the experiments—Messrs. Wishart and Bully, I think they were called—appeared disconcerted at the disappearance of the external lights, and as it appeared to me showed the six naked Jablochkoff's burning simultaneously as a sort of compensation. Another point which requires explanation, and one to which your reporter did not allude at all, is as to why so long a time elapsed, nearly an hour, before they could get any of the lamps to light at all. I myself made some enquiries, and cannot comprehend how the result of 6d. per lamp per hour is arrived at, seeing that the Jablochkoff candle alone costs 4d. per lamp per hour, and this is the smallest part of the expense. As it is said that capital is to be asked for to develope the invention, these are points which should be at once cleared up. Another point for the consideration of capitalists is that, taking the statement made at the meeting this week of the Association of Gas Managers, no less than 130,000,000*l.* is embarked in the plant, &c., of the gas companies of the kingdom, and as the Jablochkoff and Gramme plant is certainly not cheaper than gas plant, the proposed substitution could only be made at a cost of 130,000,000*l.* sterling.

But this is not the real question upon which the adoption or rejection of the system of electric illumination depends. The electric light is superior to all others, and if it can be shown that it can really be supplied at even twice the price of gas, it will replace gas in large towns within a couple of years. The great questions are the economy of the light and the minimum price per burner at which it can be produced; for a comparison between the absolute light is useless since, looking at the matter from a business point of view, one must consider the probable annual cost that must be incurred as much as the improved light. Now, assuming a house, shop, or workrooms to require 51 gas burners, at present it would be absurd to expect to replace them, unless in very exceptional cases, by fewer than 12 Jablochkoff candles. Taking the gas burners to consume 5 cubic feet per hour, the cost of gas being 4s. per 1000, the necessary illumination would be obtained for 1s. per hour, so that for the Jablochkoff system to be admissible the cost must not exceed 1d. per candle per hour, or one-sixth the price now claimed as the cost of them. The readiest means of ascertaining the probability of electric illumination coming into general use could be best ascertained by obtaining the authoritative statement of an electrician as to what is the smallest number of B.A. units that will produce a spark with the best form of Jablochkoff candle; and, secondly, the photometric value of the spark so produced. With these particulars, and an equally authoritative statement as to the number of B.A. units per horse power which can be developed with the Gramme machines, the real economy of the light could be obtained by simple calculation. All calculations attempted without these data can only be fallacious and misguiding, so that capitalists should absolutely demand them.

Hackney, Oct. 16. Thos. Smith.

EXPLOSIVES.

Sir,—During the last few years several very strong explosives have been introduced, the inventors of each claiming superior strength and freedom from danger. As regards the strength there can be no question, but the several lamentable accidents resulting from their use clearly show the advantage gained will in no way compensate for the loss of life and injury sustained, consequently ordinary powder still holds its ground, and will continue to do so for some purposes, but for blasting in mines and quarries an entirely new compound has been patented, and works erected near Plymouth,

where Espir's Powder if it is not already being made soon will be. I recently witnessed some trials of this powder, and feel certain it will be a great boon both as regards safety and utility, as well as price, being about the same price per lb. although twice the strength of ordinary powder, and if any explosive can be said to be free from danger this invention may claim the title. It will not explode when exposed to the atmosphere however roughly treated, but when confined in the rock and lighted by ordinary fuse is one of the strongest explosives known. Miners are shrewd and cautious people (the nature of their avocation makes them so), but trial will convince them of the superiority of this new invention. I have no interest in any explosive, but being a well-wisher to my native county—Cornwall—is my excuse for now troubling you with this note, as in this time of unprecedented depression in metals every economy is needed, as well as sympathy and encouragement.

Liverpool, Oct. 14. ——— ARGUS.

TASMANIAN TIN FIELDS.

SIR,—All your readers interested in tin mining must have read the letter of Mr. Joseph Pryor, late of New Console Mine, now or recently in Tasmania, with disappointment, pain, and regret. Disappointment that nothing approaching a definite description of the probable resources of the Tasmanian tin fields is given by one who presumes upon the possession of a perfect knowledge of the subject—"having inspected all the workings, but excuses himself by not presuming to trespass on your valuable space;" whilst his letter is a long tirade of incomprehensible charges against Mr. Mufford. Mr. Mufford is charged with "utter incapacity," "with borrowed ideas and those evolved from his own internal consciousness." Can writing be more gassy than the whole tenor of your correspondent's letter? Mr. Mufford's style, language, and arrangement of facts carry veracity on their face, however much more recent discoveries may or may not affect results. Your correspondent Mr. Pryor would do well to imitate his style if he wishes his experience to carry weight with intelligent readers. What has Mr. Pryor to do with the origin of the views Mr. Mufford has given—whether Mr. Ulrich derived his views of the formation from Mr. Mufford or *vice versa*, or whether they each came to like conclusions unknown to each other, is a matter of no moment to your readers. Mr. Joseph Pryor charges Mr Mufford thus:—"In the colonies a lode means a run of wash dirt or sand mixed with tin ore in any form," and "that the alluvial tin was not formed in or washed from lodes, but was formed on the face of the granite." My answer to this is all "bosh." Does Mr. Pryor give any reason for his presumptive asservation? Not the least. To argue the question one must know Mr. Pryor's description and designation of a lode. Notwithstanding his assertion my impression still remains that no lode, as understood in Cornwall or Devon, has been found to exist in Tasmania; that the tin found was thrown up at some distant volcanic period, which from the decomposition of adjoining matrix by incessant floods of rain have become washed into the crevices, gulleys, and plains during thousands of years.

If not so I, and all interested in the question, will be glad to know the facts. From Mr. Pryor's letter we receive no light at all upon the question. From private letters received we learn that there is not one mine in Australia paying. From Mr. Pryor's long letter we have confirmation of there being adjoining sets or grants to the Mount Bischoff working, with what probable results we must wait to know, suffice it that Mr. Pryor writes his father that one of these said to be a mountain of tin "was a bigger —— than New Consols." As usual your readers will admit that the pith of the whole matter is in the private letter, and not in that intended for publication. That Tasmania has shown an increase on the decrease of Australia is painfully evident to the Cornish producer. How long these supplies will last we have no evidence, but we have the fact that no alluvial deposits of diamonds, gold, or tin in Africa, California, or Australia have pervaded any great area. H. W.

Oct. 14.

TASMANIAN TIN FIELDS.

SIR,—Your correspondent, Mr. Joseph Pryor, F.G.S., in his very extensive and boastful effusion published in the Journal of Saturday last, has thought proper to indulge himself with a long list of invectives towards me respecting my reports on the above subject, which appeared in the *Mining Journal* and West Briton eight months ago. Had Mr. Pryor displayed a little coolness with common sense, without showing his teeth, he might have kept out of the dilemma which he has got into so wildly; as every unprejudiced person must see that the whole of Mr. Pryor's letter is nothing more or less than a vaunted profusion of spleen, no doubt the effect of dire disappointment.

Mr. Pryor commences his letter by vauntingly saying:—"Having inspected the tin deposits of Tasmania, and made myself thoroughly acquainted with the subject in all its bearings." I wonder if it is true. If I am not mistaken, his own letter will prove that to be error No. 1. Mr. Pryor then says:—"It is impossible to read my statements without coming to the conclusion that Tasmanian tin mining is simply a hoax." Another error. No such statement has ever been advanced by me. I stated the Bischoff's Company's works at Mount Bischoff, in four years and a half, had returned nearly 3450 tons of tin ores, yielding from 52 to 70 per cent. of tin. This is the great tin depository of the district. Again, the Mount Bischoff works were rich in their deposits, and will continue to return a large quantity of tin for years to come. Is such statement a hoax?

The next question that comes under review is the charge of plagiarisms. My answer to this is that it is like all the rest of Mr. Pryor's letter—as his fancy pictured it. I believe I read the report referred to on the Mount about two years and eight months ago, but copied nothing from it because my notes were made before; and I had no chance of doing so, as it was simply handed to me to read, and the "bald extracts" are so plain that no practical man could fail to see them, and to use the same or very similar language in describing the outlines of that district. I am indebted to Mr. Pryor for the quotations given in his letter, which proves an agreement in some points, but not in all. My report was only written about eight months ago. The description I gave of the north lode is applicable to the south lode, although not identically the same in composition. "As to the outcrop not being noticed by me as rich in ore contents," I stated the large deposits of tin ore found at the Mount can be traced to their source, which is known as the north and south lodes. As to the importance of an extensive outcrop rich in tin ore, although not proved in length or depth only by a small shaft a few feet deep; but according to Mr. Pryor's quotations, "both ore bunches were found to become far poorer from the top downwards," is sufficient reason for my saying no more about it; and the groundlessness of the conclusions I arrived at is only in Mr. Pryor's estimation, as the company's report will show. What will Mr. Pryor say when he knows there was a falling off in the last six months of something like 637 tons of ore? I do not think there will be a falling off during this half-year, unless compared with the corresponding period of 1877, as this is the wet season.

Mr. Pryor's next quotation is "a chloritic green rock, which closely resembles the gangue of some of the Cornish tin lodes." Mr. Pryor says probably he (Mr. M.) did not know what it was, or was it too "keenly for him, for it is better known to some miners as keenly peach." I wonder if Mr. Pryor, F.G.S., would know it best as keenly greens, which I confess is far too green for me to make use of.

My next blunder, according to Mr. Pryor, is on the area of the said basin in connection with the Stanhope section. If, as Mr. Pryor states, "at the time of my visit the proportion of the Bischoff was nine times the extent of what it was found in the Stanhope," it proves nothing more than I stated before, that the Bischoff is by far the richest and most extensive work. The area of the said basin measures about 10 chains from north to south and 11 chains from east to west, and the Stanhope section embraces about four chains on the east side, and is pretty well exhausted, another proof that I know something about the matter, which is unfortunate for Mr. Pryor. In the next place, Mr. Pryor says "I am informed that more tin than this has been returned from the North Bischoff Valley in prospecting (than stated by me) one section alone; at all events, it was sufficient to induce the formation of a company with 50,000*l.* capital to work this claim." Does Mr. Pryor know how many claims or sections are included in the N. B. V. Company's claim, and is its prospects good? Again, Mr. Pryor says "I am told another company is about to work the tin creek, and others to follow, with what results remain to be proved." Surely Mr. Pryor could give some account of these properties after making himself thoroughly acquainted with the subject in all its bearings. More than I am informed, and I am told was informed of the same thing nearly three years ago. Mr. Pryor again says, in reference to the Waratah lodes, "with regard to the theory advanced by me of these fissures being filled up by disintegrated porphyry is perfectly ridiculous, for it is plainly evident they are but continuations and branches of the main dyke, and the direction of which gives the crescent form to the outcrop." I contend that the Waratah section and workings are outside the crescent altogether in a south-east direction, and are no part of the crescent form.

The next point in Mr. Pryor's letter that I would refer to I grant to be a mistake as it appears in print, and was no doubt done in copying for the press. It should have read thus: The whole of the detritus is a tin-bearing porphyry and clay-slate (the latter highly charged with sulphide of iron) closely cemented, and occasionally requires blasting. Did Mr. Pryor see any antimony on the Mount? Again, did Mr. Pryor really fail to discover any mundic (pyrites), if so, his acquaintance with this subject must be small indeed? In reference to what Mr. Pryor calls my altered tone at the Mining Institute, I have only to say it was simply a review; that can be referred to at any time, and if read dispassionately will be found to confirm all my former statements. Again, Mr. Pryor has strayed from the truth apparently in a natural way, by saying—"At the time of my visit to the Mount five ordinary stamps-heads, worked by a water-wheel, were producing as much as 6 tons and 7 tons of clean ore per day." The only portion of a stamps on the Mount during my visit was an axle to build a water-wheel on. Again, I am made to say by Mr. Pryor that the Bischoff Company had to depend on the purchasing of a few parcels of ore from other companies for a dividend. Another untruth. I said it must be understood that the Mount Bischoff Company is a mining and smelting firm. In proof take the company's official statements, which show a purchase of over 2131 tons of ore in 18 months. One other remark on what my friend calls "bosh." As to the formation of tin in the faces of granite, I am of the same opinion still. The Bischoff is in the clay-slate formation, and consequently it had no reference to that district. I have said sufficient to prove Mr. Pryor guilty of pseudography, and to show his object. JOHN MUFFORD.

St. Austel, Cornwall, Oct. 16.

AUSTRALIAN TIN.

SIR,—In the Journal of March 30 you report a meeting in Cornwall of the Wheal Owles adventurers, the after-dinner speeches (for which every allowance must be made) of some of those present, when referring to Australian and Tasmanian tin prospects, convey to your readers the idea that at the present price of tin (62*l.* in London) they may look forward to an immediate reduction of supply, &c. The Chairman is reported to have said, in referring to the large quantity received from Australia last year—"But it had been said by some smelters that with anything like a material rise the supply would be increased at once. He was not so certain about that, for . . . . the surface of Australia for gold and tin had been turned over and over to an immense extent . . . . of the hundreds of tinworks in Tasmania not one of them was paying a dividend." In reply to these statements, it is true that a substantial rise in the price of tin—say 20*l.* per ton—would immediately increase supply here. As to the second, all our geologists agree that there are yet heavy deposits of gold in this continent yet undiscovered, and that tin mining is only in its infancy. Of the tin ground actually discovered not a thousandth part of it has yet been touched by a pick. Lastly, very little capital has been sunk in the Tasmanian mines; none of them are two years old, and what between making roads and erecting machinery, dams, sluices, &c., they could hardly have time to pay dividends; but there is no doubt many of them will pay enormous dividends on the small cash capital actually employed.

Another speaker referred to our tin mines being worked by our spare population. Well, in reply to this, I may mention that our average wage here is 52*l.* per annum, and everything found, board and lodging, this is for ordinary station work. Railway work and such like is from 36*s.* to 48*s.* per week, the men finding themselves; and no digger (miner) considers he is earning tucker (rations) unless he is clearing 3*l.* per week. When tin fell from 132*l.* to 100*l.*, then to 80*l.*, and then to its present price, each fall reduced the number of hands on the tin fields, the men on the poor ground knocking off and taking employment elsewhere—a rise in price would see them return again in the same proportion.

As to the Stanthorpe and New England tin fields the work already done there has opened up heavy deposits of stream tin not thought of before, and there has been extensive works for sluicing carried out, all tending to reduce the cost of production. An old mate of mine who was down here lately, and is now part proprietor of a working tin claim, told me that for two years there has been no water in the Creek running through this ground; that they have not been able to wash during that time; that they have been steady at work piling wash dirt, of which they now have a large quantity ready for sluicing, and half of the partners were now taking a spell waiting for rain. This is the case, he says, with a large district, almost one-half of the field. I can vouch for this information, and leave your readers to judge between the after-dinner flights of fancy of the Cornwall adventurers or the man from the spot.

I have no interest whatever in either the rise or fall of tin, but I would impress upon the trade that it is time for them to look the future supply from Australia and Tasmania in the face. The supply will not be affected by anything the smelters or the trade can do in England, save and excepting a very material fall in price. I would, then, recommend them to send out several thoroughly energetic sharp men to go over the different fields, judge for themselves as to our prospects, and while so doing keep their object and intentions in the background, as I find Australians have a habit of stuffing a new chum. To get information at all reliable they must go through the country in a digger's rig, and shun the Bush shanties, hotels, and sly-grog shops. Most of the reports heretofore read by the British public have been written from these places. What trust can be placed in them? There has been no lode discovered yet in Stanthorpe; but a country that has already yielded over 30,000 tons of tin has, no doubt, lodes in it, although undiscovered.

Brisbane, June 26. ——— RESIDENT.

THE MINERAL RESOURCES OF SYRIA.

[TRANSLATION.]

SIR,—I have much pleasure in forwarding herewith a brief notice of the mineral riches of Syria, believing that its publication in the *Mining Journal* may have the effect of directing the attention of English capitalists who interest themselves in industrial undertakings to the value of the Syrian mines generally, and especially to the mines of native quicksilver which I have discovered, and which, with their co-operation, might be very profitably developed. It will be acknowledged that the result of the recent Congress at Berlin is that England and France will take Asia Minor and Syria under their protection, so that reforms in accordance with the spirit of the present age will be introduced into that once blessed but now neglected country, and this land will again be brought to that degree of culture which existed there 1000 years ago. This is, indeed, a hard task! Long standing religious disputes, the invasion of barbarious people, and above all the unmentionable mismanagement of the last governors, have converted the Holy Land into a desert, where now, beside the ruins of the splendour of ancient times, the present inhabitant lives as in a dungeon, and has no notion of the former greatness and of the wealth and culture of his native land. In order to bring about again the culture of these lands, the stroke of the diplomatist's pen is insufficient; armed interposition performs but little, as we see in Bosnia. The true culture bearers are, and remain, capital and labour, if they be assisted by a wise government. Even before and at the time of Midhat Pasha some movement was made to provide the provinces of Syria and Asia Minor with improved means of communication, and to encourage mining and industrial pursuits, as is shown by the numerous concessions granted, and in connection with these numerous road and railway surveys were made; but, following the custom of all Turkish administration, the very smallest proportion of these came to anything, because each consecutive Grand Vizier destroyed, either through indolence or ill-feeling, the work of his predecessor. By the taking of Asia Minor and Syria under European protection their condition must and will become better; and taking this into consideration every capitalist will readily see that it is preferable to lay out his money in the construction of mines and roads than to let it lie idle in the banks, as at present.

The writer knows Asia Minor and Syria accurately through many years experience and opportunities there as an engineer. During his long stay there he has been able to ascertain the great wealth of these lands, and now calls the attention of enterprising capitalists to certain individual objects. First, there is the pit coal and other bituminous substances, the masses of which can be judged of from the fact that outcrops, sometimes reaching the thickness of 23 metres, occur in numerous places in the basin of the Tigris and the Euphrates. And that the working of these minerals, which in some cases are in no respect inferior to English cannel coal (*Kenellkohle*, but it is more probable that the writer means steam coal), must be very profitable may be judged of from the following facts:—In Bagdad and Mohamera they now use for the heating of steam boilers English coal, which, conveyed thither *via* Bombay, realises 7*l.* sterling per ton; and the writer knows several deposits of the finest glance coal or anthracite which could be delivered free with a good profit at from 2*l.* 10*s.* to 3*l.* per ton upon the navigable twin rivers as far as Bagdad. If one, moreover, takes into consideration the prospective development of the culture of those districts wherein fuel is entirely absent, and in which steam pumps must necessarily be used for the purposes of irrigation, an approximative calculation of the profit to be expected upon the investment of capital can readily be made.

Iron, copper, lead, and zinc occur in large quantities and of good quality principally in the environs of Diarbekir, and yet the iron-workers of the district use Persian and European iron, which is brought *via* Hamadan or Aleppo. It is just the same with lead masses which is met with near Argana and elsewhere; and yet throughout Mesopotamia such shapeless little lumps of lead as Persian shot come regularly into the market, and are largely sold because the importation of European lead is too expensive. The riches of the before-mentioned minerals, and even of precious stones (turquoise, amethyst, ruby, garnet, and so on), have already been noticed by former travellers; but it remained for the writer of this treatise to succeed in discovering a valuable deposit of native quicksilver which, once developed, will far surpass the sources of production which have hitherto been relied upon—Idria, Almaden, Zweibrücken, &c. The author has dug within an area of four square kilometres about nine shode pits three metres deep, and in each pit he has found little globules of quicksilver hanging to the pebbles of the alluvium. From samples of two cubic decimetres he has washed out by the most primitive methods a spoonful of pure mercury.

The place of discovery lies about 12 hours' ride from a frequented harbour, near a large town; water power for washing operations is at hand in abundance, wood is easily procurable, and wages amount to scarcely 1*s.* per man per day. If one compares the easy mode of obtaining the mercury with the price of the metal, it will be evident that an abundant interest would be obtained upon the capital. The author, moreover, directs special attention to the fact that in this case the winning of the quicksilver necessitates no regular mining operations, and that it is obtained by merely washing the earth raised; a workman paid 1*s.* per day, obtaining with the most simple washing apparatus from one to two kilogrammes of mercury. Moreover, the transportation to a shipping port is not expensive, since there is an even road, and the neighbouring population belongs to the most peaceable of the Orientals. If it be considered, further, that the works of Almaden, Idria, and Zweibrücken are not sufficient to meet the demand for quicksilver, and that the supply from the Argentine States is too uncertain, the high profit realisable from the working of quicksilver will be evident. Three years since, and consequently before the outbreak of the Eastern War, the author tried to turn his promising concession to profit, but he found upon every attempt that the enormous *bakschisch* demanded was so great an impediment that he determined to defer the development until a more favourable opportunity. This he believes has now arrived, and he seeks co-operation to be able to take full advantage of it.

O-Moldava bei Baxias, Sept. 20. JOSEF CERNIK, Engineer.

CANADIAN MINING NOTES—No. VI.

SIR,—Your readers have not heard from me for some time, and the reason is obvious to any person living in Canada. The fact of it is we have had the greatest political contest the country has ever witnessed. Both parties marshalled their forces, and every man seemed to take an interest in the fight. The question before the people was whether Messrs. McKenzie and Co. should give way and resign the Government into the hands of Sir John A. McDonald and Co.

The political issue—Mr. Cartwright had stated in the House that the policy of their Government was to do nothing. That Governments had no more to do with trade and depression than the "fly on the wheel," who imagined he turned the wheel. The Conservative party saw their money drained off to the States and the manufacturers ruined, and although we are expending large sums on public works, Canada was nothing but a conduit pipe to bring over English money and distribute it in the States. The manufacturers of the States with their market of 40,000,000 of people safe in their own hands could afford to make invasions into Canada and ruin our unprotected manufacturers. Canada could not stand it. England may stand it for awhile yet, but Canada was too small in population and wealth to resist the attack of the "strong man armed." The people rose as one man, and from Halifax to Vancouver Island responded to the manly cry of self-defence; the "fly on the wheel" Government was hurled from power, and Sir John will soon take the reins and govern the country.

England may read a lesson in this. How long will the people of England throw open their markets to the aggrandisement of the States? Do they think that with the skill which is daily being brought from their own shores, with the capital which is hourly accumulating, with their own markets free and with all the other markets of the world clad in armour, they can resist and uphold their free-trade notions? It is all nonsense having free trade on one side. It would pay England to make a treaty with the United States, and take her debt at a lower rate of interest, if she had the markets of the United States open to her people. It must be absolute free trade, or markets must be protected. With ourselves in Canada we felt it, and we are determined to put on a tariff against the United States manufacturers that will either keep their goods out of Canada or else compel them to assist our revenue very materially. Of course, the result will be that the manufacturers of the States will move a portion of their capital and plant to this country, and thus we shall increase the wealth of the country. So far for politics, now for mining.

The reports from Lake Superior are very encouraging. Silver Islet is turning out very well, and it only shows what pluck will do. About a year ago the chief owners of the mine were very despondent. Mr. Alexander Sybley, of Detroit, and Capt. Frue were in favour of taking the top off the islet and crushing all the available ore and abandoning the whole enterprise; but Messrs. Marvin and Larned believed in the ultimate riches of the mine. The latter bought the former out, and have gone down about 50 ft., when the abundant riches that they are now reaping made themselves manifest. Of course this gave a stimulus to mining on the North shore, and as a consequence the McKellar Island on the same lead, directly west, was asked for. Mr. McIntyre is now in Toronto with regard to the sale of this property. It is to be hoped that he will not be either the "fool that holds too long, or the fool that sells too

cheap," according to the city gentleman's definition of fools, The McKellars' have held long enough without doing anything; the Ontario Government gives no encouragement for the opening of mines, and the consequence is that the holders of mines have to sell for little or nothing. Why our Ontario Government does not study the laws of Sweden and make the mines of the country a source of revenue is a wonder to any man that knows anything about mining. The offer for the McKellar Island is $30,000, or about 6000*l.* sterling. If it is worth anything it is worth ten times that amount. However, those who go into new countries always get the best opportunities. We find, we develope to a certain extent, we sell to the Americans, and the wealth of the country goes to New York.

The Great Provincial Exhibition of the Province of Ontario is now being held. This is Friday, Sept. 27, and the Exhibition commenced on Monday in this city. Lord Dufferin made a very good speech. He is particularly happy in his utterances, knows what to say and how to say it. His allusions to the undeveloped wealth of Canada, particularly with regard to mining, and to the daughters of Canada, were full of instruction. The Great North-West lies before us, and we have to subdue it. Victor Hugo's toilers of the sea—the fight between Man and Nature—that is the conflict. And it is a glorious country, it is full of all the undeveloped wealth that abounds in Nature, it is a glorious inheritance. Yet, if the people of England who are now unable to put any bread in their mouths, if such people read this, or if it comes before the eye of any real philanthropist with brains and capital, let both classes know this—that Nature is hard to overcome, and that although they get 160 acres of fertile land for nothing, there must be a continuation of both classes to conquer Nature. They understand this in the States. They form small colonies of 50, or 60, or 100, and take up the land, and put their brains and capital and labour altogether on the land. Thus by three energetic forces they overcome Nature, and all come out rich.

I have long ago advocated the doctrine of the Army of Peace. Yet there are more engaged in the less beneficial but more lucrative employment discussing the Army of War. How long England is going to carry on in the same old way is a question which the English people will yet have to solve. How long you are going to have half of the proceeds of the industry of the land go to the support of people who are educated each day in the great and difficult problem of doing nothing; how long the pauper poor-houses and work-houses of England are going to remain as they have been and are now is the question of the day? Cut the Gordian knot. Ship them all to Canada. The same amount of money that is now spent in supporting the poor-houses will place your poor in affluent and independent circumstances in Canada. But it will have to be done by the people of England. We will give you the land, and you will use the money that is now spent to support these people in bringing them to your colony. I have a good deal to write with regard to the Crœsus and some other mines, but reserve it till next letter.—*Toronto, Canada, Sept.* 27. BOURNONITE.

THE ECLIPSE GOLD MINING AND QUARTZ CRUSHING COMPANY.

SIR,—I am sorry I am again obliged to trespass upon your accustomed courtesy in replying to Mr. Nelson's letter of Oct. 3, and inserted in the Journal of Oct. 5, impugning the correctness of my remarks respecting himself. As far as regards Mr. Nelson, in verification of my statements I append two extracts from Mr. Rickard's letters, dated respectively Aug. 22 and Sept. 14, 1877, which I think will satisfy any unbiassed person. With regard to the mismanagement of capital, fortunately I had a colleague well versed in mining enterprise, and not likely to be easily swayed into the expenditure of money by sensational letters and telegrams, or in any other way, without due consideration. As to the further replies by Mr. Nelson, with the exception of the extracts referred to above they become simply matters of truthfulness, and as such I will leave them to the shareholders, very many of whom have known me a considerable time. ROBERT U. POTTS.

Hillside, the Avenue, Beckenham, Oct. 16.

Extract from Mr. Rickard's letter, dated Aug. 22, 1877:—

Mr. Nelson has not been of the use to me I anticipated when I last wrote, and if the establishment is to be cut down I do not see in what way I can employ him. He has no taste for book keeping or assaying, having handed over the former to Mr. Beaman and totally neglected the latter; in fact, I cannot find evidence of his having made any assays since he has been here—no assay book having been forthcoming on my applying for it. No wonder, therefore, the mill operations should have been conducted in the dark, and without the ray of a single assay to show the direction in which they have been drifting.

Extract from Mr. Rickard's letter, Sept. 14, 1877:—

As to Nelson, he is just about as unfit a person for his position as could have been selected; he was on his good behaviour for the first few days after my arrival, but could not keep it up, and I soon began to smell his breath strong of whiskey, and noticed a good deal of excitement in his manner on his return from Independence. . . . He had bought a buggy and four horses, which he was keeping at the company's expense (although we have three horses and a very good buggy of our own), and I had to speak somewhat strongly before he removed them into Independence, and sent back our buggy.

JAVALI MINE.

SIR,—Beyond the shareholders, who doubtless eagerly watch the Journal for the reports, there appears to be no notice taken of this promising mine. Besides the very favourable return made by the manager, it is surely much in favour of the valuable position of our property to know they actually express disappointment at being unable to make a still larger remittance, and say that only more rain is required to enable them to do so. The debenture interest is regularly paid. The rate of the returns just to hand will pay interest and expenses twice over, while if the returns increase surely our directors will be inspirited to make a reservoir and put down more stamps. HOPEFUL.

SENTEIN SILVER-LEAD AND BLENDE MINE, FRANCE.

SIR,—On the 1st and 2nd instant I carefully and thoroughly inspected the above-named mine, which is situated a few miles in a westerly direction from the large and flourishing town of St. Girons whence every requisite in the shape of provisions, materials, &c., adapted to mining purposes can be obtained. Here is also the terminus station of the railway to Bordeaux, Paris, Marseille, &c. The mine is approached from the town and station by an excellent carriage road, and the cost of transit from the mine to Swansea, everything included, would not exceed 35s. a ton. At the foot of the mountain range of the Pyrenees, on which the mine is situated, is a commodious as well as extensive dressing or reduction establishment, comprising, as it were, no inconsiderable village in itself. There is an excellent residence, large and commodious, with suitable offices for whatever purpose; well and conveniently constructed dwellings both for officers and operators, commodious storehouses, in which there is a large quantity and a great variety of stores—iron, steel, &c., with a vast quantity and variety of tools and utensils adapted to every required purpose; carpenters', smiths', and wheelwrights' shops, stables, &c.; a 12-battery stamping-mill, crusher, &c., for the reduction of the ore, surrounded (all within an extensive lofty building) by all the varied and necessary apparatus required to form a complete establishment for the reduction of metallic ores. There is an extensive series of calcining furnaces and a smelting one, in which from 15 to 20 tons of ore was reduced daily. There is a large number of new wagons for the transport of the ores from the mine, with machines on which to weigh them; tramroads, tramwagons, quantities of spar rails, with a host of things too numerous to mention. There is an ample and never-failing stream of limpid water, by which, through the aid of water-wheels, the whole of the machinery is driven.

During the time of the cessation of operations at the mine everything on the establishment has been well and carefully attended to, is in excellent condition, and ready at once for the resumption of work. At the mine itself there is a good stable, and house accommodation sufficient for 300 men, with beds, bedding, &c., as at the reduction establishment. Near the mine there is a forest of good timber suitable for all purposes, and which can be obtained at a mere nominal price.

The outcrop of the gigantic lode on which the mine has been worked can be traced in almost continuous unbroken regularity for a length of miles, with frequent interspersions of galena—sulphuret of lead—and of rich carbonates, together with blende, accompanied by gossan (the oxide of iron) of the most approved and promising description—the all but never-failing precursor or harbinger of metallic wealth; the true indicator of subterranean riches. This extraordinary mine, rendered extraordinary by the magnitude of its lode, the abundance of wealth which it has yielded, and which it will yet yield, has during the latter years produced, as per the mine books, upwards of 30) tons of lead ore per month, was opened 24 years ago, and was worked during a period of 17 years. At the time of the commencement of the late Franco-German War no fewer than 450 men were employed in and about the mine and smelting works, but in consequence of the general pressing into the army operations ceased, and have not since been resumed, consequent upon the advanced age and declining health of the proprietor. The mine is entered by five different mouths or entrances, taken up successively from the rising surface of the ground—that is to say, each entrance embracing a width of from 20 to 30 ft., opens the back of the immense mass of lode, which rises prominently above the general surface. It is at the first opening in the rising series, or at the easternmost one of the last four, that the general workings or mining operations have been so conducted as to afford access to the whole of the workings to the westward, for the direction of the lode is about east and west. This opening from the declivity of the ground tending easterly is the deepest of the last four, and, as before said, opens an ingress into the workings above, and to the part whence the riches were extracted—into the great hollow. In this level there is a tramroad, down into which the material from above was thrown, and thence brought out to the surface, where it was culled, the refuse rejected, and the ore sent down to the establishment of reduction to be prepared for the market.

The length of ground opened is about 235 fms., the vertical depth of the deepest part of the workings not exceeding 50 fms., but on the incline of the lode above 100 fms. Embracing the whole of the length and depth of the workings, or of the ground laid open, comparatively little of the latter has been excavated and extracted; as it were nearly the whole of the ground, or the principal part thereof, still remains intact to be excavated or worked away, and to every appearance is of the same quality and character as that which has already been excavated, dressed, and sold. The strength and width of the lode have already been noticed—a width varying from 6 ft., to 8, 10, and in places to over even 20 ft.; long stretches of it are rich in solid galena, and in that which is almost so—stretches or lengths of many fathoms there are in which the galena is more or less combined with blende, but the blende seems to be invariably of large grain, a circumstance which expedites and facilitates disunion. In other parts of the lode pure, unmingled, large, and extensive masses of rich blende abound.

A very considerable portion or length of this gigantic and fertile lode is a mass of rich carbonate—carbonates reaching a percentage of 60 or 70 of metallic lead, rich deposits of galena therein abounding. I think it not at all improbable that the carbonate, with increased depth, will give place to sulphuret. It must be readily acknowledged that the lode of this mine is of unusual magnitude, strength, and fertility, and that every appearance which it presents justifies the strong opinion that it is capable of producing in future riches both in quantity and quality equal to the production of the past, and inspires the greatest confidence that it will not fail to do so. From the great width of the lode, together with the length for which it can be seen and traced on the back, and from its close compact nature its duration, notwithstanding the number of hands that may be employed in excavating it, would seem to be indefinite. During the last eight years in which the mine was wrought the lode was so productive of the ores of lead that those of zinc (blende) were discarded, consequently there is now lying at surface no inconsiderable quantity of lead ore (galena) and of blende—more particularly of the latter—that might be selected from the rejected heaps and made available.

I have already noticed the easternmost mouth or opening of the westernmost group into the workings of the mine. On the declivity of the hill, 4 8 fms. to the east of this entrance, is the first entrance—*i.e.*, the first numerically, in going from the houses westward towards the old or principal mine. This is merely a level taken up from an abrupt rise of the mountain, and extended (say) 40 fms. into it. The intention or motive in taking up this level was to continue it on the lode westword until it reached under the westernmost or principal workings, and thus to open on the lode, and to drain the mine by this deeper leve' or adit to a much greater depth than that of the present botton. The design was good, and the extension of this level should be accelerated with all possible speed. In order, therefore, to expedite the accomplishment of a work so necessary I would suggest that an intervening shaft or two be sunk from the surface on the lode to the vertical depth of the adit, and there drive each way, east and west, from the respective points, levels to meet each other. This work accomplished, and this deep level brought home under the workings, you would have a profitable mine of almost unlimited duration.

This is looking into futurity; but irrespective of the bringing home of this deeper level there is also sufficient ore ground laid open to last, as it were, a life time.—*July* 6. JOHN LEAN, M.E.

ROCK-BORING MACHINERY.

SIR,—With reference to our letter of the 1st inst., Messrs. Hathorn and Co. request us to state that they have recently sent an Eclipse drill to Roman Gravels. LE GROS, MAYNE, LEAVER, AND CO.

London, Oct. 19.

AIR COMPRESSORS, AND ROCK DRILLS.

SIR,—In the Journal of Jan. 19 you had occasion to give some account of the working of my air compressors and rock drills which are employed in various places both in this country and America. Since then I have had the pleasure to meet Capt. Frank Drake, of the Eberhardt and Aurora Mining Company, Nevada, and he most kindly and willingly has furnished me with some of the particulars respecting the working of the rock drill machinery I sent out to him some two years ago for the driving of the Eberhardt and Aurora Tunnel, which is located 7700 ft. above sea level. The tunnel measures 7 ft. by 9 ft. at the face, and has been driven mostly through terrible hard quartz rock, which has been to drill and blast out. Two hand turning compressed air drills are worked in the tunnel forehead, and drill from 25 to 30 blast holes, varying in length from 2 ft. 6 in. to 3 ft. each. These holes are drilled, blasted, and the debris cleared out in each shift of eight hours, so that each following shift has a clear way and face to start upon. The day is divided into three eight-hour shifts. Six men are employed each shift—drillers, carmen, mechanic, and boiler-man. The tunnel was at the commencement driven a short distance by hand labour, but the progress made was very slow, the rock in some places being so hard that it required as many as 116 drill bits to drill a hole 22 in. deep by hand; whereas, in the same rock, the same depth of hole can be drilled by the machines with six drill bits. In the present rock a set of three drills to each machine will drill 24 holes, each 3 ft. deep, without refettling.

The rate of progress made in the tunnel in April was...	248	feet
Ditto, in June	173	,,
Ditto, in July	266	,,
Total for three months	687	feet.

The slowest month made in June—173 ft., which was in extremely hard rock. The best month was run in July last year, when 285 linear feet were driven. Capt. Drake (who has driven this tunnel about 3000 linear feet with this machinery) estimates the saving to be 50 per cent. cheaper than that of hand labour, also states that he will be able to complete the tunnel, driving the remaining 3000 ft. at an average rate of 250 linear feet per month.

One of the same pattern drills as used in the above-named tunnel has drilled during the last twelve months (in the limestone belonging to Mr. W. J. Smith, Trindon Grange, county Durham, where several machines can be seen at practical work) over 18,000 ft. of 2¼ in. blast holes. These drills have recently been put to work in the same district by the Hetton Colliery Company, East Hetton Colliery Company, also St. John del Rey Mining Company, Brazil.

Newcastle-on-Tyne, Oct. 17. J. G. CRANSTON.

ROCK DRILLS IN MINING.

SIR,—The advantages of rock-drills in mining operations was, as I see from the report in last week's Journal, briefly referred to at the Great Laxey meeting, but the reference appeared to me quite half-hearted, and no allusion was made to the absolute saving of money that would be ensured by their adoption. I admit that there is some difficulty in showing the approximate saving in a popular manner, but an imaginary calculation may be made which will make the matter clear to shareholders generally. With hand drilling in ordinary rock it is good work if 3 fms. per month progress be made by two men, and putting these down at 3*l.* per month per man, it will be found that the actual cost of driving is 2*l.* per fm. Now, several of the American drills have reached 26 fms. per month in hard ground, and in the *Mining Journal* of Sept. 14 it was stated that in the St. Gothard Tunnel the McKean drill had penetrated 94 fms. 2 ft. in the month, or more than 3 fms. per day, and it is well known that the rock they are there driving through is of a very tough and difficult character. That the comparison, however, may be quite fair to hand drilling McKean's drill may be left altogether out of the question, and it may be assumed that Dunn's, Schram's, Warrington's, Darlington's, Hathorn's, and the various others in the market may be relied upon for ½ fm. per day, or 15 fms. per month.

Now, suppose 20 ends are driving, and that the cost of agency is 250*l.* per month; and, further, that the average value of the ground removed is 4*l.* per fathom, the 20 ends would turn out 60 fathoms per month, and the produce would sell for 240*l.*, of which 120*l.* may be taken as the amount available to pay the 250*l.* agency, consequently the loss is 130*l.* per month. Now, if these 20 ends were driven by Darlington, Hathorn, or any other of the average speed drills mentioned, there would be turned out not 60 fms. per month but 300 fms. per month, the value of which would be 1200*l.* The cost per month, including interest on outlay with rock drills, would be 1½ times that of manual labour—that is, 180*l.* by machine against 120*l.* by hand. Deducting 180*l.* from the 1200*l.*, there remains 1020*l.* instead of 120*l.* to pay the 250*l.* agency, so that the adventurers instead of making a loss of 130*l.* per month would actually make a profit of 770*l.* Of course these proportions would vary in different cases, but it will suffice to show that the advantage of using machine drills is not limited to the actual saving per fathom, as greater relative profits result from the augmentation of small profits, the number of fathoms being four times, five times, or six times greater as the case may be, so that the profits are always kept above the fixed charges, and there are always some profits for the adventurers. As to the relative merits of the drills, I believe there is little to choose between them. They will all work well with proper case, and each has some particular merit. ENGINEER.

Oct. 14.

ROCK DRILLS—PATENTS.

SIR,—In the Journal of Aug. 31 you were kind enough to insert a letter from me calling attention to the fact that Mr. Schram's rock drill is identical with that described in the specification of my patent, No. 3342, A.D. 1874, which was sold to Mr. Schram as having been abandoned by me in favour of my present cheaper system, which I consider greatly preferable. I begin to think, however, that my former patent must have had a greater value than I set upon it, for I find that a patent of Mr. W. W. Dunn, No. 764, A.D. 1878, just published, is also, as far as I can see, identical with mine in the methods which it describes and claims for constructing and actuating the slide valve, and also of operating a self-acting or automatic feed. I must repeat what I said in my last letter, that anyone comparing my said patent, No. 3342. A.D. 1874, with Mr. Dunn's, No. 764, A.D. 1878, will be able to judge whether the arrangements are not practically identical. E. EDWARDS,

Southampton Buildings, Oct. 17. Engineer and Patent Agent.

"ENGINEER," AND THE LLANRWST MINE.

SIR,—Your irrepressible correspondent, "Engineer," has had the temerity to appear again in the Journal, reasserting a falsehood; but whether or not he can claim extenuating circumstances on the ground of his being intoxicated by a "halo" I take not upon myself to determine. But this much is clear—his reckless disregard of truth. He asked me for facts, and I at once gave them, but there appears to be no affinity between him and them, and hence there was no recognition. The facts which he seems to require are such as would favour his own prejudices, but those which oppose them are unceremoniously discarded. He made assertions concerning me which I contradicted; he made no attempt to invalidate that contradiction, but slumbered awhile, and then came up again as oblivious as before, repeating the same *ipse dixit*. It is useless to proceed in such a manner as that with no definite object of contention. The "you did" and "I didn't" style of wrangling may do very well for "Engineer," who for aught I know to the contrary may fancy that by such a pursuit he is prosecuting his engineering, but it will not do for me. If as he states he writes with an intimate knowledge of his subject, it surely cannot be difficult for him to furnish some evidence in proof of his assertions, but I incline to the opinion that he is not careful to discriminate between them and facts—those stubborn but essential factors in all controversial engagements. He has made unfounded statements in the most public manner concerning myself, and styled them facts, whereas the mildest term which can be applied to them is fiction. Perhaps the immersion of his imagination in a "halo" has conduced to that delusion. If it were now convenient to substitute a galaxy of facts for this "halo" of unfulfilled promises, it is doubtful, indeed, if "Engineer" would be able to identify or recognise them as such, especially if they pertained advantageously to the Llanrwst Mine.

I think if "Engineer" could strip the scales from his visual orbs he might discover in various directions mines which cannot realise the expectations which were founded on their appearances in brighter days, and for no other reason than the embarrassment arising from external causes at the present time.

"Engineer" appears to be very solicitous to obtain information for the public—the non-investing curiosity mongering portion of it, I presume—but what have we to do with it, or it with us. Is the Llanrwst Mine public property?—just as much as a bank or a railway is public property, and no more. Can "Engineer" assume the right to probe these institutions as to their goings on, although the public are vastly more concerned with them directly and indirectly than with the Llanrwst or any other mine. His pretence is a shallow subterfuge, a piece of arrant officiousness, and nothing less or better. If this mine has not made the returns which it was expected it would have done there is a reason for it, which I stated in a former letter, and which is a matter concerning the shareholders, and not "Engineer" or the outside public, for whom he manifests so much interest and undertakes to speak, although he has no right or authority in the matter.

"Engineer" avers that the public have lost several thousand pounds through the trafficking in these shares, but that cannot be so, as trafficking in mine shares means speculative transactions, in all of which what one loses another or others is supposed to have gained; the public, therefore, can be in no sense impoverished by such speculations. By the same rule it cannot be enriched, but by the developed resources of a mine or mines it is; and in this sense the Llanrwst Mine, instead of decreasing the public wealth several thousand pounds, has already added to it to that extent. What one has lost and another has gained is no matter of moment to the public, as such as individual members and their connections only are affected by such changes.

I am a shareholder in the Llanrwst Mine, but have never trafficked in the shares, consequently I have neither gained or lost, but stand in the same relation to the public as those that have whatever their individual gains or losses may have been. The question from the political economy point of view is as to whether the money expended on the Llanrwst or any mine might have been employed more successfully in the development of wealth in some other enterprise; but that I will leave for "Engineer" to determine, as he is evidently in need of a subject.—*Llanrwst, Oct.* 10. ROBERT KNAPP.

[For remainder of Original Correspondence, see to-day's Journal.]

INDUSTRIAL UTILISATION OF SOLAR HEAT.—The experiments carried on by M. Mouchot during the Exhibition are highly instructive. They had for objects, on the one hand, the cooking of food, and the distillation of alcohols; on the other, the use of solar heat as a motive force. In the matter of cooking it was found that mirrors of less than one-fifth square metre sufficed to roast half a kilogramme of beef in 22 minutes, to complete stews in an hour and a half that required four hours with an ordinary wood fire, and to raise to boiling in half an hour three-quarters of a litre of cold water. A pure brandy was obtained in a short time from the distilling apparatus. For obtaining the motive power M. Mouchot had constructed a large solar receiver, the mirror having an aperture of about 20 square metres. In its focus was placed an iron boiler weighing with accessories 200 kilogrammes, and having a capacity of 100 litres, 70 being devoted to water. This apparatus was put in action on Sept. 2 for the first time; in half an hour the water was raised to boiling, and a pressure of six atmospheres was ultimately registered. On Sept 29, a pressure of seven atmospheres was reached in two hours, notwithstanding several passing vapours. On different occasions the steam (with a pressure of three atmospheres) was made to drive a Tangye pump, raising 1500 to 1800 litres of water per hour a height of two metres; and to produce ice in a Carré apparatus.

PUDDLING AND MELTING IRON.—To facilitate the heating of the blast and also to prevent smoke Messrs. CADDICK and LEWIS, of Stockton-on-Tees, propose that the bottom of the chamber of the furnace in which the puddling or other operation upon the metal is carried on shall be formed double or as a box, and divided into a series of compartments or channels which communicate with each other, but so that whilst one compartment or channel communicates with the next at one end thereof that next channel communicates with the third at the opposite end, and so on alternately, according to the number of divisions employed, so that the air driven into the first by a blower or by other suitable means is conducted in succession through these parallel chambers, and becomes increasingly heated by the heat of the bottom of the furnace until it is allowed to escape into a closed ash-pit under the fire-bars to pass up between those bars and act on the fuel and aid its combustion in the combustion chamber; part of this heated air also passes into chambers acting as clinker boxes at the sides of the combustion chamber to aid in keeping such boxes cool, whilst these boxes prevent the clinkering of the fuel to the brick sides of such combustion cham-

ber. These boxes also become reservoirs of highly heated air, which is thence conducted by suitable pipes or passages at the end and sides of the furnace to act on the smoke and products of combustion from the fuel in the combustion chambers.

FOREIGN MINING AND METALLURGY.

The intelligence which comes to hand from the various centres of production is unanimous in recording a certain quietness in the Belgian iron trade. The rolling-mills have tolerably well filled order-books, and the mechanical construction establishments, thanks to adjudications of rolling-stock which have just taken place for the Belgian State Railways, have work assured to them for some months to come, but the proprietors of blast-furnaces have considerable difficulty in obtaining any higher rates for their pigs, in consequence of the competition of the products of the Grand Duchy of Luxembourg. The Rodange Blast Furnaces Company has held its meeting for 1877-8. One of the blast-furnaces of this company was lighted on June 21, 1878; it is now in regular operation, and the price obtained for its production has not been very unfavourable. A quantity of railway plant shipped in July from Antwerp for South America has been lost at sea, and will have to be promptly replaced by MM. Verhaeren and de Jager. A Belgian vessel has been loading at Antwerp during the last few days for Tunis. She has on board, besides a quantity of rails, a saloon carriage for the special use of the Bey of Tunis; this carriage was made at the works of MM. A. Cabany and Co., of Malines.

Orders for domestic qualities of coal continue to come to hand in Belgium, but this circumstance affords but a slight mitigation of the depression from which the Belgian coal trade is suffering, and at present it has not exercised any influence on prices. The only effect of the orders received has been that rather more animation has been imparted to the navigations, and especially in the Charleroi basin, where stocks have been somewhat reduced. In the Mons basin, on the other hand, deliveries are being made more freely by land than by water; this is due to certain works which are being executed at present upon the Mons and Condé canal. In the Mons basin the glassworks, the ironworks, and the sugarworks are giving out a fair number of orders, which, with the demand prevailing for coal for domestic purposes, maintains a relative activity in the coal workings of the district. At Liége there has been a fair demand for some qualities of coal, but prices have remained without variation. The Bonne Espérance Colliery Company has just held its meeting for 1877-8. The directors reported a loss of 135*l.* for the year, as compared with a loss of 5449*l.* in 1876-7, so some little improvement would appear to have been established in the position of the undertaking.

The French Iron Trade has not presented much change. The Providence Company (Hautmont) has just informed its working staff that from Tuesday, Oct. 15, wages will be reduced from 5 to 10 per cent. according to the various classes of employees. The Bohemian Collieries Company has issued its report and accounts for 1877; the year resulted in a loss of 21,546*l.* The Luxembourg Blast-Furnaces Company realised in the year ending June 30, 1878, a profit of 1072*l.*; this is satisfactory, as in one or two previous years the company's operations resulted in a loss. The company had only one blast-furnace in operation in 1877-8, and this furnace had, of course, to support all the general and financial charges of the year. The progress realised by the company in its last financial year, and especially during the last seven months of it, has been principally due to the increase in the daily production, the reduction in the price of minerals, and the better yield obtained from them, and the reduction effected in the consumption of coke. The daily production increased in 1877-8 to the extent of about 4 per cent.; 82 per cent. or the minerals used last year were also derived from the company's iron workings, as compared with 58 per cent. in 1876-7, and it is expected that the company will be shortly enabled to supply its own wants in the matter of minerals. If a little improvement should be established in business the company will light another furnace.

In the French coal trade some uneasiness has been excited by a project for deepening the Seine between Paris and the sea to a minimum of 10 ft. 8 in. French colliery-owners fear that if this project is realised it will be possible to bring English coal to Paris without transhipment, and consequently at lower rates of freight. The Minister of Public Works (M. de Freycinet) has appointed a commission to enquire to what extent these apprehensions are well founded. The commission is also to enquire whether the junction of the Escant with the Meuse and that of the Aline, the Oise, and the Marne with the Saône, as well as the general improvement of navigations in France, will not compensate French coalowners for any losses which they may experience upon the Paris market. The commission is further to enquire what reduction in freights should be made in order to maintain French coal in its present position in the French capital.

Success of a Belgian Iron and Steel Firm.—The annual report of the Société John Cockerill, of Seraing, which is shortly to be presented to the shareholders, shows that there has been a large accession of orders in its Bessemer steel department. The production for the past financial year amounted to 83 000 tons, as against 65,000 tons in 1876-77. The rolling mills also turned out 57,000 tons of rails, as compared with 45,000 in the previous year. The net working profit has been 2,400,000 fl., the dividend being equal to 50 fl. per share. The balance-sheet shows on the creditor side a total of 14,544,000 fl., and on the debtor 9,667,000 fl., leaving a balance to he good of 4,877,000 fl. This statement is eminently satisfactory.

Nickel Smelting at Krageroe, Norway.—At Krageroe, Norway, magnetic pyrites holding on an average 1·25 per cent. of nickel is worked by the following process, which Friedr. Bode describes in Dingler's Polytechnic Journal:—The raw ore is smelted with slag from refining in a 13-ft. three-tuyere shaft furnace, the slag made being thrown over the dump while the raw matte, holding 3·5 per cent. of nickel, is roasted in stalls. This roasted matte is smelted in a low furnace with one tuyere, 4 ft. high. The slag, holding 1 to 1·5 per cent. of cobalt, goes to the ore smelting. The matte made contains 30 per cent. of nickel and 15 per cent. of copper, and is returned to the same furnace, which concentrates it to 60 per cent. of nickel, 30 per cent. of copper. The sulphur is only 10 per cent. This matte is ground and roasted completely in a small reverboratory furnace, and the oxides are reduced with charcoal powder in graphite crucibles, yielding 68 per cent. of nickel and 30 per cent. of copper. By the addition of copper this product is smelted into an alloy of one of copper and one of nickel, which is marketable.

Coal and Iron in Canada.—The mineral wealth of the Dominion is enormous, and as yet but slightly trenched upon, because while coal is abundant and of excellent quality on the seaboard, it is almost excluded from the United States by heavy duties, and competed with in the limited Canadian market, not only by the yet abundant stores of wood, but by English coal, brought as ballast by the huge timber ships resorting to Quebec, where English coal is often sold as cheaply as in London. The same cause has checked the development of iron smelting and salt manufacture, both these articles being taken as ballast to Quebec. The more important minerals now worked in Canada are gold, silver, copper, lead, iron (of all kinds), coal, plumbago, phosphate of lime, mica, barytes, asbestos, slate, gypsum, petroleum, rock salt, antimony, iron pyrites, and manganese.

The Isabelle, Exchequer, and I.X.L. Companies.—Those interested in these properties will peruse with interest the following particulars, extracted from the Alpine Chronicle of Aug. 24:—

Since the formation of this county a more favourable opportunity for mining men to obtain valuable mining property has never been presented than Alpine can offer at this period in her history. It is not owing to the barrenness of our mountains that Alpine is not more favourably known in mining circles, but it is owing to the ignorance and bad management of those who have attempted to develope some of the best mining property in the county, and the failure of the score of processes for working ores that have been tried here since 1865, when the Rivot furnace was erected at Markleeville. We have had introduced here at this late day a process that has been eminently successful in reducing the most rebellious ores in Alpine county, and at an insignificant expense per ton. Through this process the Advance company has been enabled to make regular shipments of bullion to San Francisco for several weeks past. Now that we have a practical reduction process, there is encouragement for mining men to take hold of mines in Alpine and develope them. With a mill at the mine, to save the expense of transporting the ore, $10 ore would pay a profit to the mine-owner and enable him to develope his mine with its product. There is scarcely a mining claim in Alpine county that would fail to produce $10 or $15 ore from the croppings. In all the mining districts of the county there is an abundance of wood and water, the latter sufficient to run hundreds of stamps, and mining enterprises can be managed here with a reasonable outlay. The county will recuperate under the continued success of the new reduction process at the Advance mill, and those having interests here are already feeling encouraged, and steps are being taken by San Francisco parties to inaugurate a mammoth mining enterprise in the Silver Mountain district early next spring, when other claims at Silver Mountain will be started up. With our mines placed in charge of superintendents who thoroughly understand silver mining and are economical in their management, we are confident that Alpine will soon fall in line as a bullion-producing county. Alpine has one bullion-producing mine, and a judicious outlay would soon give us a score of them.

Meetings of Public Companies.

DERWENT LEAD MINING AND SMELTING COMPANY.

An ordinary general meeting of shareholders was held at the offices of the company, Austinfriars, on Wednesday,

Mr. W. Edwards in the chair.

Mr. J. H. A. Smith (secretary) read the notice calling the meeting, and also the reports of the directors and agent, as follows:—

Your directors have now to lay before you the audited accounts for the year ending July, together with a full report on the mine by the manager, Mr. Morpeth.

In presenting the accounts, which have already been circulated, your directors have much satisfaction in calling your attention to the favourable comparison they bear to the balance-sheet submitted last year. The returns of pig lead which in 1876-7 were 206 tons 15 cwts. 1 qr., realising 4416*l.* 15s. 6d., or an average price per ton (exclusive of silver) of 20*l.* 12s. 11d., have during the past year risen to 295 tons 1 cwt. 3 qrs. 17 lbs., which at an average of 18*l.* 10s. 2d., produced 5791*l.* 14s. 3d.; the total expenditure for 1877-8, after deducting the amount chargeable to capital, being 7983*l.* 11s., against 8123*l.* 0s. 11d. in the preceding year. It will thus be seen that strenuous efforts have been made by the board, assisted by the manager, to counterbalance the unprecedented depression in the price of lead by exercising the closest economy in every department. Your directors refer you to the manager's report for details of the reduction effected at surface and underground, which has enabled the returns to be increased simultaneously with a reduction of expenditure. They are happy to recognise the cheerful manner in which the workmen in their employ have accepted the reduction of wages which from time to time it has been necessary to make to meet the emergency of the case.

Your directors have no doubt that the report of Mr. Morpeth will be considered very satisfactory, and have pleasure in referring to his remarks on the present appearance of the mine. The 93, east of Jeffries' shaft, now worth 1½ ton of ore per fathom, is being pushed into virgin ground in the great limestone, and in this productive stratum will give fully 12,000 fms. of stopes. The communication of the 93 between Jeffries' and Westgarth's will be effected by the end of the present year, where 1200 fms. of more stoping ground will be available for working. The Sun vein at the 70, which has hitherto disappointed the expectations expressed at the last annual meeting, is again looking more hopeful. During the past year the driving of the 74 west of Westgarth's, and the cross-cut at the 95 east of Jeffries', have been temporarily suspended, owing to the large amount of dead work then in progress in other portions of the mine. They will, however, be resumed in a short time, as the cutting of the Burn Shields Haugh vein, or of the north vein, would materially enhance the value of your property. Mr. Morpeth states that the former vein if found rich would give a practically unlimited run of ore ground, while the north vein is entirely untouched in the great limestone, in which stratum alone there would be 18,090 fms. of ground. Though, as will be seen, there has been a considerable increase in the returns, the reserves of ore ground now laid open are 1080 fms., or double what they were 12 months ago, and these will be further increased by the end of the year.

Your directors stated in their last report that they had given their attention to the question of rock-boring machinery. After investigation of the merits of several machines they selected the Dunn rock drill, which has now been in operation at the mines for the past nine or ten months, with very satisfactory results. The costs attendant on the use of the drill for the eight months from February to September have been—For underground labour. 36*l.* 5s.; surface charges, driving engine and compressor, wages, coal, oil, &c., 130*l.* 15s. 4d.: total cost, 494*l.* 0d. 4d. Distance driven 34 fms. 2 ft. 8 in., or about 14*l.* 8s. per fathom. To drive the some level by hand would have cost about 15*l.* to 15*l.* 10s. per fathom, and required two years continuous working. In addition to the saving thus effected it should be stated that the exhaust air by ventilating the level has enabled the work to be continued without the expense and delay of making the rises, which would otherwise have been indispensable. One effect of this increased speed has been to bring into the current accounts charges for unproductive work which under the old system would have been distributed over two if not three years. Your directors very much regret the present serious depreciation in the price of lead, as shown in the accounts; pig lead which two years ago realised 21*l.* 10s. now producing less than 16*l.* per ton. But for the fall of prices in this metal and in silver the returns would more than meet the working costs. In view, however, of the diminution of supply occasioned by the stoppage of some of the largest lead mines in the kingdom, it is hoped that there will be no further important fall in price, while a revival of trade would lead to a demand necessarily accompanied by a corresponding increase in the value of lead.

Your directors hope at the next annual meeting to be able to speak more favourably of the condition of the metal markets, in the meantime they will continue their efforts to secure by the employment of improved machinery or otherwise the most economical method of carrying on the operations. While confidently awaiting the return of more remunerative prices for lead, they cannot but congratulate the shareholders on the possession of a property which Mr. Morpeth's report shows to contain a vast extent of stoping ground, "which may be made available without any further expense for sinking shafts," and with reserves from which during the next twelve months we shall receive "greatly increased returns of ore." Your directors regret to have to announce the retirement from the board through unavoidable circumstances of their late Chairman, Mr. E. W. Wingrove, The directors have elected Mr. Samuel York, of Wolverhampton, to fill the vacancy thus caused. Messrs. Brandt, Stansfield, and Co., the auditors appointed at the last annual meeting, retire, but being eligible offer themselves for re election.

William Edwards, Chairman.
J. H. A. Smith, Secretary.

Oct. 14.—Twelve months have now elapsed since I wrote you the last annual report on these mines, and it now becomes my duty to report to you what has been done during the year ending with June of the present year, and in doing so I shall begin first with underground. In this department the strenuous efforts put forth last year to develope new ground, and so lay open good reserves of payable stopes have been continued with but very little abatement, and in some instances, which will be hereinafterwards touched upon, we have been successful, while in others the reverse has proved to be the case. The amount expended for the year below ground was in stoping 2427*l.* 10s. 1d.; driving levels and cross-cuts, 1551*l.* 14s. 1d.; sinking and rising, 84*l.* 3s. 6d.; repairs to Jeffries' shaft 50*l.*; fixing air-pipes in Westgarth's shaft, 20*l.*; timbering levels, and other sundry work, 478*l.* 19s. 6d. = 4617*l.* 7s. 2d., about 4·8*l.* in excess of last year's expenditure. Ground cut bystoping was 536 fm. 1 ft. 10 in. The levels extended upon the veins were:—The 9½ east of Jeffries' shaft, 20 fms. 5 ft. 4 in.; the 93, west of ditto, 26 fms. 1 ft. 11 in.; the 70, west of ditto, 17 fms. 3 ft. 5 in.; the 70 east, included in stoping; the 50 fathom level, east of Reed's shaft, 17 fms. 0 ft. 3 in.; the 93, east of Westgarth's, 42 fms. 4 ft. 8 in.; the 74, west of ditto, 8 fms. 1 ft. 10 in.; the 40, east of Jeffries' shaft, 26 fms. 2 ft. 8 in.: equal, 159 fms. 2 ft. 1 in.—Cross-Cuts: The 95 north, at Jeffries' shaft, 16 fms. 3 ft. 5 in.; from the rise over the 95 to the 80, east of Jeffries' shaft, for ventilation, 2 fms. 1 ft. 11 in.; the 80, south of Jeffries' shaft, 2 fms. 3 ft. 9 in.; the 40 fm. level, north-east of Taylor's shaft, 10 fms. 0 ft. 6 in. = 31 fms. 3 ft. 7 in.—Winzes: The 70 under Sun vein, opposite Jeffries' shaft, 3 fms. 3 ft.—Rises: Over the 95 fm. level, 18 fms. east of Jeffries' shaft, 2 fms. 0 ft. 10 in.; over the cross cut at the 95, opposite Jeffries' shaft, 1 fm. 1 ft. 5 in. = 3 fms. 2 ft. 3 in.: total, 734 fms. 0 ft. 9 in.—Stopes: These all the year round over the 95 fm. level, east of Jeffries' shaft, continued to yield fairly, though they did not maintain the high average value they were of at your last annual meeting. West of same shaft, over the 93, we have stoped during the year ground that was poor and rather disappointing, and upon the Sun vein the stopes have not yielded so well as the winze sunk opposite Jeffries' shaft under the 70 led us to expect.

Levels: The 95 east, which has been driven for the sake of expedition by the side of middle vein, has opened out good ground, and where we are stripping down the vein in this level, about 8 fms. back from the end, it is 6 ft. wide, and worth 1½ ton of ore per fathom; and in the stopes the backs are yielding 15, 18, 18, 18, and 18 cwts. of ore per fathom respectively; average width of vein 6 ft. The importance of this drivage will be more readily understood if we remind you that the level is being pushed into virgin ground, which in the Great Limestone alone will give fully 12,000 fms. of stopes. The 93 west has been in a strong vein at the bottom of the Great Limestone, yielding at times a few cwts. of ore per fm., and at other times only spots of ore. The roof of this level, however, is improving for good backs, and in the stopes following the end we have of late got an excellent improvement: their respective value is 18, 6, 28, and 20 cwts. of ore per fathom; width of vein all through, 4 ft. The 70 west has been poor, but looks more hopeful The same level eastward (worked by driving and stoping), and the stope in the back have both yielding pretty well, but not to the extent we had hoped to see them. The 50, east of Reed's on the north vein, made no discovery of importance, and was abandoned. The 40, east on Sun vein, which was stoped to make a tramway to the eastern workings in the upper strata, yields a little ore. The 93 fm. level, east of Westgarth's shaft on middle vein, was driven, by four men, until the end of January in the tuft sill lying immediately underly the Great Limestone, when a commencement was at once made to drive the end by rock-boring machinery, which has enabled us to push the drivage about three times faster than it was possible to do by hand labour, and at a little less cost. Another advantage—and a very important one—in connection with boring by machinery in this level is that the exhaust air ventilates the place well, whereas if working by hand labour the level would be airless, and both difficult and very injurious for the men. Soon after the introduction of boring-machinery into this level we came to a caunter lode, which caused a throw of several feet in the strata, and instead of the tuft sill the level was at once into hard limestone, when the vein was mixed with capels and the carbonate of iron, and the ground being full of small cavities our progress was thereby rendered very much slower. In last year's report hopes were held out that in this level a caunter lode would be met with that might improve the middle vein in richness, and I am happy to say that such has proved to be the case, for in driving we have passed through excellent ore in several places, and the vein in the present end of the level is worth 1½ ton of ore per fathom. There are yet 14 fms. to drive to hole to the 93, west of Jeffries'. The 74, west of Westgarth's, on middle vein—for some time suspended—laid open decent stoping ground, and there is a good lode standing in the back. We should much like this level extended, as within 20 fms., or possibly less, the Burnshield's Hough vein, which has yielded largely when worked in this district, will be cut, and if found rich would give a practically unlimited run of ore ground.—Cross Cuts:—The 95, opposite Jeffries' shaft, after being driven 43 fms. 1 ft. in hard ground towards the narth vein, was suspended in March to lighten the heavy cost for dead or axploratory work then in progress. The importance of this trial should not, however, be lost sight of, as the north vein, in the great limestone, is entirely untouched for the whole length of the sett, in which stratum alone there would be 18,000 fms. of ground; and, as a further inducement to the prosecution of this work we may say that this vein in the little limestone above was both wide and rich. We estimate the lode would be cut in about 30 fms. more driving. The 40 cross-cut, 126 fms. east of Taylor's, was extended to a point 29 fms. 2 ft. 10 in. north of middle vein, and failing to discover anything of importance, was discontinued in January. The other cross-cuts were simply for ventilation and pass-ways, and do not require anything special said of them.

Winzes and Rises: These two were of an unimportant character. The reserves of stoping ground at present are—Over the 95, east of Jeffries', 164 fathoms; over the 93, west of ditto, 347 fathoms; over the 70, west of Sun vein, 13 fathoms; over the 70, east of ditto, 7 fms.; over the 93, east of Westgarth's, 537 fms.; over the 74, west of ditto, 12 fathoms: total, 1080 fathoms, some 530 fathoms more than was the case last year. The productive ground explored for the year was 597 fms. 0 ft. 7 in., which yielded 1150 shifts of bouse, and produced 439 tons 2 cwts. 2 qrs. of lead ore, making an average of 14 cwts. 2 qrs. 24 lbs. of ore per fathom, or 5·09 per cent., at an average cost of 4*l.* 19s. 11d. per fathom. The unproductive ground explored was 137 fms. 0 ft. 2 in., at an average cost of 8*l.* 1s. 8d. per fathom.—Surface: In buying new plant for rock boring machinery, and fixing the same, there was expended at Westgarth's 687*l.* 14s. 3d.—Dressing-Floors: One frame fixed with sheave at top and bottom, with endless chain partly made, 30*l.*—Smelting Works: One Schiels' patent fan, with belt, fixing same, &c., 26*l.* 14s. 9d.—Sykehead: Embankment of lower reservoir raised, and faced inside with stone, 46*l.*—Powder Magazine: New lightning conductor, 8*l.* Total amount expended on these works, 789*l.* 9s.

Dressing: The amount of ore dressed on the 1st floor, 406 tons 12½ cwts., cost 1*l.* 3s. 6d. per ton; second floor, 27 tons 16 cwts., cost 2*l.* 10s. 11d. per ton; third floor, 4 tons 10 cwts., cost 3*l.* 9s. 9d. per ton; burnt waste, 4 cwts., cost 7*l.* per ton: total, 439 tons 2½ cwts., cost on the average 1*l.* 5s. 9d. per ton, being 10s. 3d. per ton, or nearly 30 per cent., cheaper than in the year preceding. This saving (over 200*l.*) is partly the result of the stone-breaker, which still does its work very effectually.—Smelting: 439 tons 2½ cwts. of ore have been smelted, which made 274 tons 3 cwts. 2 qrs. 24 lbs. of rich lead and 20 tons 18 cwts. 0 qr. 21 lbs. of slag lead—total, 295 tons 1 cwt. 3 qrs. 17 lbs.—and yielded 3878 ozs. 1 dwt. 18 grains of silver, from which take 1782 ozs. 3 dwts. 14 grains allowance for desilverising, and 2095 ozs. 18 dwts. 4 grains remain, which with the lead realised 5791*l.* 14s. 3d. Average cost of smelting, 1*l.* 3s. 5d. per ton. Average assay of ore, 73·09 per cent.; produce, 67·21 to which add fumes not smelted, 3 per cent.—70·21 per cent., showing a loss in smelting of 2·88 per cent. Comparing this with the last annual report, it will be seen that there has been a steady advance in the returns of both lead and silver, which, notwithstanding the serious fall in the price of lead, have realised 1374*l.* 10s. 5d. more this year than last, whereas the excess of expenditure below ground this year over last is only 428*l.*, as stated before. The sales of rich lead for this year average 18*l.* 10s. 2d. per ton; for last year, 20*l.* 12s. 11d.—a difference of 2*l.* 2s. 9d. per ton in favour of the latter. And, moreover, the reserves of stoping ground have been during the year increased by 530 fms. By Christmas or the new year the two 93 fm. levels will have met, and a direct communication made between Jeffries' and Westgarth's shafts, when the whole of the large extent of stoping ground over these two levels (say, 1200 fms.) will be thoroughly ventilated and available for working. In conclusion, from the foregoing remarks it will be seen, even at the present depth of the shafts, what a vast extent of stoping ground is and can be, by the further prosecution of levels, made available without any expenditure whatever in sinking shafts, and our present reserves are such that for the next twelve months we shall be able to give you greatly increased returns of ore.—John Morpeth.

The Chairman said he should be happy to hear any remarks which any gentleman had to make on the report and accounts.

A short discussion ensued with regard to the form of the accounts, and in reply to one or two suggestions, the Chairman said that at the next meeting the accounts would be made up in a form which would meet the suggestions which had been made.

The Solicitor, in reply to a further question, said the directors considered all the unpaid calls good. As regarded charging interest on the unpaid calls, the directors had the power to do it, but he believed they had not yet adopted it.

A Shareholder asked Capt. Morpeth, who was present, how long it would take to communicate the 93 fathom level?——Capt. Morpeth said till about the beginning of the new year. He added that he wished there was even a greater length of ground to drive through, inasmuch as the ground was very rich.

The Chairman said they thought to have driven through before this meeting, but a drawback prevented it. They were now within 14 fms. of holeing the two ends, and they hoped to cut through that by the new year.

Mr. Burls said the reports were really so exhaustive that there was little left to enquire about.

Mr. Murchison said the cross-cut which Capt. Morpeth alluded to in the 95 to the north lode was very important, and it would only take about three months to cut it if they put the boring machine there. The boring machine would be removed from the levels at the end of the year. The original cost of the boring machine was not only applicable to this drivage which had been going on, but the machine would be useful for carrying on other portions of the mine. They could put it to drive the cross cut to the north lode, and the manager stated it would only take three months to cut it by the machine. In the Little Limestone that lode had been very rich, and in the Great Limestone it was likely to be still more productive, because in that district it was found that the Great Limestone was the best sill, and, therefore, there were good grounds for believing that it would be better there. With respect to driving the 74 level, that was an important point which, perhaps, Capt. Morpeth would explain.

Capt. Morpeth said that in the 74 end on the middle vein they calculated they were within 20 fms. of a lode which was a caunter vein, and it was important that it should be resumed. It was a lode which had never been worked in Derwent, but in an adjoining sett it yielded very largely.

Mr. Murchison: When we reach the north lode in the Great Limestone we shall have a run of 1800 fms. on the lode. The cross-cut has been driven some distance, but this company suspended it a few months ago in consequence of the dead work which had to be done, but as soon as communication is finished between the two ends at West Garths it will be proceeded with, and we expect it will be cut in about three months.

The Chairman said the present company was the only one that had ever got down to the 95, but this company had worked at it from both ends.

Mr. Murchison said the great drawback had been the low price of metal. Mr. Beaumont, who had hitherto supplied about one-fifth of the produce of lead in England, had suspended the working of all his productive mines, and was only laying out a little money on unproductive mines. The London Lead Company had also, he believed, done the same. This might tend to strengthen the prices.

The Chairman then formally moved the adoption of the directors' and managers' reports and the accounts. He thought that, on the whole, the shareholders would admit that the reports were very satisfactory. It must be a matter of satisfaction to the shareholders to know that, notwithstanding the depressed state of the lead market and, indeed, the market for every other metal, the receipts from the working of the mine had increased during the last year, notwithstanding that the price of the metal had been reduced from 21*l.* per ton to something like 16*l.* per ton. They had raised and sold 1300*l.* worth of lead more than in the previous year at comparatively the same or under the same cost. Of course, if the price of lead had kept up they would have shown a very different state of things. The directors had taken very great interest in this matter, and had visited the mine several times during the past year, and the secretary had been there three times, which was a convincing proof that those in power had the interests of the company at heart, and had used every means in their power to bring things to a successful issue. The drill which had been referred to had worked satisfactorily, and when it was considered that this machine would do in one year what it would take three years to do by hand labour, they would see what great advantage they derived from it in the way of saving of time, which was an important consideration in mining operations. The cost would be the same, or a little less, but the advantage was in the great expedition with which the mine was opened up. Another economy had been effected in the decrease of cost of dressing and smelting the ore, which was a very great advantage to the company. The prospects of the mine were very much more favourable than twelve months ago, and if the price of lead were to resume anything like its previous value the Derwent Mine would be a very prosperous concern. The directors would, as heretofore, devote all their energies to the economical working of the mine, and also to the quick dispatch of the business connected with it, which was an important element in mining enterprise.

Mr. Daukes seconded the resolution, which was put and carried.

On the motion of Mr. Spillman, seconded by Mr. Bush, the auditors, Messrs. Brandt, Stansfield, and Co., were re-elected.

On the motion of Mr. Banner a cordial vote of thanks was passed to the Chairman and directors.

The Chairman, in acknowledging a vote of thanks to himself and

the directors, said that the directors had hitherto endeavoured to do their duty to the best of their ability, and they would continue to do so. But at the same time they could not take all the credit for the efficient way in which the affairs were conducted, as it was mainly due to their very able local manager, Mr. Morpeth, and he could safely say that no mine possessed a better manager. There was no question that Mr. Morpeth had the interests of the company thoroughly at heart, and that he did everything that was possible for the speedy and economical working of the mines. Mr. Morpeth was also much respected personally, and held a very good position in the district for his general good sense and judgment. He considered the company fortunate in having such a man to conduct and superintend their operations.

WHEAL BASSET MINING COMPANY.

The quarterly meeting of shareholders was held at the mine, on Tuesday, Mr. R. R. BROAD in the chair.

The notice convening the meeting was read, and the statement of accounts for the 12 weeks was submitted, showing a loss on the three months' working of 897*l.* 7s. 9d., and a total debit balance of 2278*l.* 9s. 4d. The arrears of call amounted to 900*l.*, mostly good.

Mr. MARTYN, in reply to a SHAREHOLDER, stated that they owed 2025*l.* 2s. 4d. to the bankers, but there was one pay not included in the statement; it was usual for them to have one back pay.

The agents reported upon the various points of operation, and in conclusion said—"Our mine has greatly improved for tin within the past few years, but we regret to state that although we have some thousands of fathoms of ground that will leave a profit at a moderate price only for tin, with the present low price we recommend not to be dependent upon circumscribed operations, presuming satisfactory assistance can be obtained to pump the water from the abandoned mines, which hitherto has solely been borne by this mine."

Mr. WILLIAMS asked whether the 115 cross-cut on the west lode was near the carbona, or had they any idea that the carbona was near?—Captain TREVENA stated that they had come across a lot of branches, which they thought led to the carbona. Supposing this cross-cut were driven to the 115, and they were satisfied they were come to the carbona, they would not continue driving the 115 to the west.—Mr. R. MARTYN said the future depended upon the action taken at that meeting, and upon the success of that action.

The CHAIRMAN explained that they had been troubled by a large quantity of water from neighbouring mines, and shareholders holding more than half the mine had waited on the steward of the lord to consult with him.

Mr. MARTYN said that, being apprehensive of their position from the first to the last, and, of course, knowing that they had borne a very heavy load all the time, by which they were very nearly crippled, he thought that steps should be taken to obtain some assistance in order to continue operations, provided they were to continue at all. Of course, there was only one place where they could obtain assistance, and that was at Tehidy office. He went there and laid the matter before Mr. Bolden, Mr. Basset's steward, showing that unless some decided action were taken to render the adventurers some material assistance, he feared they would collapse. Mr. Bolden brought the matter before Mr. Basset, who expressed his regret at having to give an unfavourable answer. Mr. Basset, however, was fully sensible of the great difficulties the adventurers had had to contend with in having to keep back the water from the eastern district without any assistance from the mines, and he (Mr. Bolden) would suggest to them the advisability of bringing before the managers of their neighbouring mines the importance of taking some steps to aid them in meeting the great water charges to which they were put, for he could but feel how important the matter was to them.

After some observations from the PURSER, Mr. MARTYN remarked that the determination arrived at was that unless they had some very material assistance the mine would be stopped, so far as the present company were concerned. He said that morning received a letter from the largest shareholder, who said he would not carry on three months longer unless they received the assistance that was fair, under the circumstances, that they should receive to carry on the work.

Mr. R. H. WILLIAMS, after stating that the mine should be worked and developed in order to give some returns to the adventurers for their outlay, said it appeared to him that they had made rather a virtue of necessity. Most of the ground in which they were working seemed to be exhausted or entirely taken away. Independent of any extraneous aid he must say that there was one point of value in Wheal Basset which was a mine in itself. He wanted them to continue sinking the Carnkie shaft, and to open the lode at the 140. One of the most important parts of the mine is considered to extend the 60 cross-cut another 10 fms., and cut the new copper lode, and at that point of intersection it would be found in every respect to be similarly situated in relation to the contra lode as the original deposit of ore in Wheal Basset, and the great deposit of copper ore discovered in North Wheal Basset. That was his candid opinion. He thought it was due to the adventurers of the lodes and surrounding mines that they should carry out a scheme of development that they intended to carry out, and he did not see how they could ask anyone for money unless they could show a feasible scheme in order to warrant the outlay of the money. He strongly advocated the development of the point referred to instead of going on scraping at their present work. He showed that it could be done on easy terms, and he certainly thought some one was to blame for not having the copper lode developed before—who, he did not know. If they did not work that point they might as well stop the mine at once.

Mr. MARTIN said he had as great confidence in the copper lode as Mr. Williams did. He could say that for many years befose he had any connection with the mine it was considered highly important that the cross cut should be put out. That cross-cut was started by two shareholders. but were not for some reason or other worked out.

Mr. WILLIAMS thought it could not have been started in a better place if it had been started that day. There was no reason why they should abandon the mine, he firmly believed that there was a rich lode there which they might develope, and if some of the shareholders did not choose to go on with it there were others who would.

The report and accounts were ultimately passed, a call of 5*l.* per share made, and a deputation appointed to meet the managers of some of the adjoining mines to see whether some arrangement could be made by which they could have assistance towards meeting the water charges.

THE CANADIAN COPPER AND SULPHUR COMPANY.

The directors' report, to be submitted at the next meeting, says: The shareholders will remember that at the last meeting it was decided to continue working up stocks at Capelton, and exploration with the diamond drill at Acton, on condition that the company's position did not become financially worse. On Feb. 7 in the present year, the secretary intimated by circular the directors' decision to continue these operations on the ground that it was desirable still further to prove the Acton Mine by means of the diamond drill, stating that the available cash surplus was not being diminished. The surplus at June 30, 1878, was 5500*l.*, while at Dec. 12, 1877, it was 4000*l.*, so that the operations referred to have resulted in the practical gain since that date of 1500*l.* It is true that the book loss for the year is 6877*l.* 19s. 3d., but the bulk of this was made prior to Dec. 12, and had the works been then stopped, the stocks of materials and ores, which have since been utilised, would have become entirely valueless. The decision come to has, therefore, been justified by the result. At Acton about 1800 ft. have been bored without resulting in any considerable find of copper. In one part of the mine, however, the indications were sufficiently favourable to decide the directors to sink a small shaft, provided that this could be done at a moderate expense. Instructions were sent out to this effect, but the sinking has been greatly retarded by exceptionally heavy rains filling the mine with water. The directors are still in the belief that copper will yet be found in this mine, although the character of the formation is such as to make its discovery very much a matter of good fortune. The directors have received the report as to the surface value of the lands belonging to the company which is referred to at last meeting. The principal properties were elaborately reported on, and estimating the value of the others on a similar basis, the directors are confirmed in their belief that 100*l.* is a moderate estimate of the value of the whole, apart from general value. This it is impossible to estimate, but it is beyond doubt that some of the properties contain large quantities of copper-bearing ores, which, in better times and with improved methods of treatment, may yet be turned to profitable account. The position of the company is now, therefore, this—after meeting all liabilities, there remain the properties, with the works and machinery, and about 5000*l.* of cash assets. There is also a small stock of fines at the Capelton Works, but this will soon be exhausted, and what is now being worked up is of inferior quality. Under these circumstances, and with the present very low price of copper, it appeared to the directors that to continue operations much longer would necessarily result in loss, and they, therefore, telegraphed to their manager in Canada on the 1st. inst., instructing him to dismiss all the workmen at Capelton, and to put the works in order for a long stoppage as soon as the stocks were exhausted. At the same time they instructed him to continue the sinking of the trial shaft at Acton, leaving to his discretion, for the present, the question of exploring the mine further with the diamond drill. Failing an immediate satisfactory discovery at Acton, the directors recommend that the company should be put into liquidation.

[For remainder of Meetings see to-day's Journal.]

COPPER.—The imports into England of copper for the first eight months of the following years were:—1876, 53,204 tons; 1877, 62,266 tons; 1878, 58,073 tons. The exports were 33,129 tons, 33,470 tons, and 37,596 tons respectively.

Registration of New Companies.

The following joint-stock companies have been duly registered:—

WIGAN CLOTHING COMPANY (Limited).—Capital 2500*l.*, in shares of 5*l.* Established for the manufacturing and trading in clothing. The subscribers (who take 30 shares each) are—E. P. Ridgway, Manchester; J. Bennett, Manchester; T. M. Yates, Blackrod; J. A. Dawson, Cheetham; J. Aspinall, Wigan; R. Wallwork, Southport; J. Parker, Rochdale.

PERCY STEAM-TUG MUTUAL INSURANCE ASSOCIATION.—This company is unlimited. Established for the mutual insurance of iron and wood steam-tugs and boats, insured with the company by members of the company. The subscribers are—J. Lakey, 76, Henry-street, Newcastle-on-Tyne, steam-tug owner; R. Todd, Jarrow, steam-tug owner; L. Brown, South Shields, steam-tug owner; J. Ridley, Gateshead, steam-tug owner; J. T. Lough, Newcastle, steam-tug owner; S. Stoddart, Newcastle, steam-tug owner; R. Moore, Newcastle, steam-tug owner.

HEATHCOTE AND COMPANY (Limited).—Capital 3000*l.*, in shares of 5*l.* To carry on the business of hide, skin, and fat merchants and brokers, and to purchase such business from Messrs. J. and W. Heathcote in Derby. The subscribers are—J. Heathcote, Derby, 150; W. Heathcote, Derby, 150; H. Simpson, Derby, 6; W. Brassington, Derby, 6; W. Domber, Derby, 6; T. Miller, Derby, 6; J. Hall, Milford, 6.

THE RYE CHEMICAL AND MANUFACTURING COMPANY (Limited).—Capital 10,000*l.*, in shares of 20*l.* each. To carry on the business of the Rye Chemical Company, by purchasing it and the goodwill thereof and every property thereto attached. The subscribers (who take one share each) are—J. Belcher, Rye; T. J. Smith, Cadborough; F. Atkinson, Rye; J. Smith, Iden; J. Cole, Rye; R. Lancaster, Rye; C. Cook, Rye.

HUGHES'S STEAMSHIP COMPANY (Limited).—Capital 500,000*l.*, in shares of 20*l.* each. To ratify, adopt, and carry out a preliminary contract between H. N. Hughes, of Liverpool, shipowner, and F. J. Pilcher, of Liverpool, for the purchase of various steamships, and to carry on generally the business of steamship owners. The subscribers (who take one share each) are—H. N. Hughes, Liverpool; W. H. Dixon, Little Sutton; W. Johnston, Liverpool; C. Forwood, London; J. Taylem, Liverpool; E. Taylem, Dumfries; T. Ronaldson, London.

ALDRINGTON ESTATE INVESTMENT COMPANY (Limited).—Capital 100,000*l.*, in shares of 10*l.* To acquire by purchase or otherwise parts of the Aldrington estate, next Brighton, to purchase or lease houses, &c. The subscribers (who take one share each) are—J. H. Stretton, 75, Cornhill; E. Vaughan, 6, Moorgate-street; T. H. Aysom, Tollington Park; H. Adams, Lewisham; N. Jenkinson, 6, Moorgate-street; W. H. Stretton, 8, Suffolk-street; F. Stephens. 94, Piccadilly.

ESSEX BRICKMAKING ASSOCIATION (Limited).—Capital 10,000*l.* in shares of 5*l.* each. To carry on the business of brickmaking in England, and to make and sell bricks, tiles, chimney pots, drain and other pipes, &c. The subscribers are—W. Younghusband, 31, Plowden Buildings, 40; G. de Witte, 31, Kensington-square, 40; A. de Costa, 6, Jeffrey's-square, 40; B. T. Kindersley, 72, Harley-street, 10; E. F. B. Miller, 70, Queen's-street, 40; F. V. Andrews, 8, Old Jewry, 5; G. E. Newton, 8, Southampton-street, 1.

FOREIGN MINES.

ST. JOHN DEL REY MINING COMPANY (Limited).—Advices received Oct. 1, 1878, ex Mondego (s.), dated Morro Velho, Sept. 2:—

GOLD EXTRACTED TO DATE.—The produce for the second division of August, a period of eleven days, amounts to 12,571·8 oits.=1449·3238 ozs. troy, equal to 1143 oits. per diem. It has been derived as follows:—

	Oits.		Tons.	Oits. per ton.
General mineral	7,929·3	from	1385	= 5·725
ditto Praia	1,340·5	,,	240	= 5·585
Mineral free from killas	2,858·0	,,	366	= 7·809
	12,127·8	,,	1991	= 6·091
Retreatment	444·0	,,	—	= ·223
Total	12,571·8	.....	1991	= 6·314

Advices received Oct. 15, 1878, ex Elbe (s.), dated Morro Velho, Sept. 18:—

GENERAL OPERATIONS.—In both the output of mineral and quantity treated the return of duty is lower, the water supply being much less than that available during July. The average quantity passing over the establishment per minute throughout the rainy season is about 1800 cubic feet; for July it was 1510, and for August 1200.

GOLD PRODUCE FOR THE MONTH OF AUGUST.—The gold extracted during the above period amounts to 35,221·9 oits.=4060·5122 ozs. troy. It has been derived as follows:—

	Oits.		Tons.	Oits. per ton.
From general mineral	22,190·3	from	4000	= 5·548
,, ditto Praia	3,347·2	,,	677	= 4·944
,, mineral free from killas	8,020·0	,,	1103	= 7·271
	33,557·5	,,	5780	= 5·806
Retreatment	1,664·4	,,	—	= 0·288
Total	35,221·9	,,	5780	= 6·094

The above return is higher by 687 oits., and the yield per ton by ·358 oits., than that for July. The sundry produce recovered to date, from below the old amalgamation floors, amounts to 1061 oits. of gold and 354 lbs. of mercury, of a total value of 479*l.*

With a view to a more reliable estimate of the value per ton of the mineral laid open in the western part of the mine, the treatment of the ore freed from killas has been confined to the output derived from sections 255 and 234—the two most western sections of the mine. An average return of 7·174 oits. per ton for so large a body is an assuring fact that the late addition to the mineral ground west may now be considered as an important reserve.

CONSTRUCTION AND REPAIR WORKS.—In the arrastre department of the amalgamation-house new staking floors have been laid down. The wheel and multiplying gear required for the Californian pan is well forward, also the Elephant stamps, the completion of which has been subject to many suspensions, owing to the frequent call for repairs elsewhere. At the Herring stamps new floors, with increased area, are also in course of preparation, the result obtained by this system of extension both in recovery of gold and mercury being such as to warrant its application to all the mills.

COST AND PROFIT.

Produce for August being.....	35,221·9 oits.		
Less loss in melting...	310·2 ,,		
	34,911·7 at 7s. 9d. per oit. —	£13,528	5 8
Cost		7,788	3 11½
Profit		£ 5,740	1 8½

The excess in cost is due to the large amount of timber taken into use both in the mine and mechanics' departments, increased surface labour, engaged on rego extension and repairs, and part charge of one wire-rope taken into use at "A" shaft. During the past and coming months many items should be considered as "extraordinary expenditure" until the completion and reconstruction of the new and old works already too long neglected.

MINE.

Mineral raised from the mine	6506 wagons.
,, quarried per borer per diem	2·04 ,,
Average number of borers daily	117·81
,, ,, ,, natives ,,	203·66

SUMP AND STOPES 278 "A" and "D."—There is no special change to advise in the character of the mineral body. On the eastern side of the sump or forebreast the width of pure lode has slightly declined. The extraction of good mineral from the stopes has been large, and their general condition both as to width and quality is fully equal to that reported for the last month.

In forming a comparison as to the relative productiveness of the lode now and at this time last year, it should be fully borne in mind, as stated in January last, that as advance easterly is made so a contraction must be expected, the present bottom and direction of the sump being now beyond what is considered to be the more productive zone of the mineral body. On the other hand, there has been a gain of stoping area with increased facilities for extraction.

EASTERN RESERVES—STOPES 255 "D" AND 217 "C".—Beyond an increased extraction, especially from the ground above the sump, the general condition of the lode is without change. At 217 "C" the poor mineralised killas forming part of the north wall is being left as a support to that section.

WESTERN SECTIONS.—At both 255 "A" and "D" and 234 "B" the same favourable indications continue, the present width of both high and low grade mineral being fully equal to that of the preceding months.

The western advance level is temporarily under suspension both from want of force and increased difficulty of output. With the advance of stope 234 "B" in that direction, and completion of the "B" shoot from top of section 256, referred to in last report, operations will be again resumed.

"B" shaft has been sunk 10 ft. 4 in., and the cross-cut to same from 255 "D" driven 9 ft. 5 in.

GOLD EXTRACTED TO DATE.—The produce for the first division of September, a period of eight days, amounts to 8193·8 oits.=944·6117 ozs. troy. It has been derived as follows:—

	Oits.		Tons.	Oits. per ton.
General mineral	5,136·5	from	974	= 5·275
ditto Praia	803·5	,,	170	= 4·726
Mineral free from killas	1,993·0	,,	247	= 8·069
	7,933·0	,,	1391	= 5·703
Retreatment	260·8	,,	—	= ·187
Total	8,193·8	,,	1391	= 5·890

MINE.—The return for the first fortnight of the month, a period of 13 working days, is as follows:—

Mineral raised from the mine	2971 wagons.
Mineral quarried per borer per diem	1·90 ,,
Average number of borers daily	119·69
Average number of natives daily	200·00

No alteration in either the eastern or western sections to advise. The great scarcity of water still continues.

The following telegrams have been received:—

On Sept 19.—Produce eight days (first division of September) 8250 oits.; yield 5·8 oits. per ton. All going on well, but duty of stamps short, from short supply of water.

On Sept. 27.—Profit for the month (August) 5700*l.*

On Oct. 10 (first received on the 6th, but unintelligible).—Produce ten days (second division of September) 12,750 oits.; yield 5·8 oits. per ton. Water very short.

On Oct. 12.—Produce for month (September) 30,500 oits.; yield 5·8 oits. per ton. Duty of stamps short, from short supply of water. All going on well.

DON PEDRO NORTH DEL REY (Gold).—Report for August: Produce from 1922 tons, dry weight, 1608 oits. = 683*l.* 8s.; cost, including all general expenses, 2103*l.* 1s. 10d.—Telegram from Rio, dated Oct. 11, referring to a later date than the above report, advised 1650 oits. for the month of September.

JAVALI.—Extract from manager's report, Oct. 15: "In previous years the month of August was the wettest month of the rainy season, but this year it is quite the reverse. I was unable to mill as much quartz as I otherwise should have done in the latter part of the month; I had even to use the engine, therefore my remittance is not so good as I wished it to be, but we did our best, as it is impossible to work against nature." The following is my report for the past month's working: In the mine 40 1-3 varas were driven; all the rest of the extracted ore was taken from the surface. During the course of last month we had to re-timber several main levels in the mine to secure them against accidents, and everything is looking now first rate.—Mill and Remittance: 30 stamps worked 24 days, crushing 1960 tons of ore, which yielded 520·25 ozs. of smelted gold, at an average of 5 dwts. 7½ grs. The value of the quartz has been falling off a little, but I hope it will increase again this month.—Tailing Mill: I worked this month all three pans, and treated 280 tons of tailings, which gave 57·50 ozs. of smelted gold, at an average of 4 dwts. 2½ grs. to the ton. This is indeed a very good result, and I am quite sure that the exposure of the collected tailings to the influence of the atmosphere added considerably to it. I had not the least trouble in cleaning and retorting nor smelting this gold.—Receipts and Expenditure: The two boxes of coin, with $5208 were duly received. The expenditure has been 937*l.* 3s. 6d.; the remittance is valued at 1325*l.*, thus leaving a balance profit on the working expenses of 387*l.* 12s. 6d.

SANTA BARBARA (Gold).—Mr. Hilcke, Pari, Sept. 14: During August 1126 tons of mineral were stamped, producing 4152 oits. of gold, and 59 tons of refuse sand re-treated by the pulveriser, yielding 36 oits. of gold, or a total of 4188 oits. of gold, equivalent to 3·719 oits. per ton of stone stamped. The produce of 4188 oitavas, valued at 8s. 6d. per oitava, amounts to 1779*l.* 18s.; and the estimated working cost for the month at exchange 23½d., being 1867*l.* 19s. 5d., leaves an estimated profit of 711*l.* 18s. 7d. for August. Mr. Hilcke reports that the lode wrought upon during the month had underground no alteration, continuing to produce good quality ore, with an encouraging improvement in the yield of gold per ton. The mine captain reports as follows:—The quantity of ore raised during the month amounted to 1411 tons, of which 285 tons were rejected as refuse stone, and 1126 tons treated at the stamps, 59 tons of refuse sand re-treated by the pulveriser producing 36 oits. of gold. Average quantity of ore raised per borer for the month 34·5 tons.

NEW ZEALAND KAPANGA (Gold).—Telegram from the agent: Since last message the return has been 88 ozs. of gold; ore raised 45 tons.

BLUE TENT.—The directors have received the following telegram from their manager, Prof. Price: South Yuba claim, partial clean up, $10,600.

ALMADA AND TIRITO CONSOLIDATED.—Telegram from Mr. Clemes, dated Sept. 14:—Ley in Mina Grande improving.

CHONTALES CONSOLIDATED.—The directors have advices from their manager, dated Sept. 5, accompanied by a remittance valued at 1050*l.* 8s. During the month of August they crushed 1640 tons of ore, which produced 412 ozs. of gold, or an average of 5 dwts, per ton; value of the gold, 1050*l.* 8s.; total cost for the month, 770*l.* 8s.; profit, 280*l.* The above cost includes the sum of 1·4*l.* charged to construction account.—Mines—San Sebastian: Drove in main level 3 varas; lode in present end small; rose in No. 2 new rise east 8 varas; stoped in high stopes east 202 varas; stoped in No. 1 new stopes east 207 varas; stoped in No. 2 new stopes east 272 varas. Total quartz raised from the above mine during the month 1435 cars, or 1250 tons, worth on an average 5 dwts. to the ton. The operations in the above mine have not been fully carried out during the past month, as several of the men have been and some are home now with fever.—Estrella: Stoped from new stopes east 216 varas. Total quartz raised from the above mine during the past month 433 cars, or 372 tons, worth on an average 5 dwts. to the ton. Here, like San Sebastion, several of the men are home with fever, consequently there has little more than stoping been carried on during the past month, but on the 2nd of this month I got some fresh men to go on with the new rise.

COLORADO UNITED.—The advices of the superintendent, dated Sept. 26, are to hand this morning. He says:—We had such an enormous lot of rock to clear away before we could even get at the mineral broken in the lower level that we were considerably delayed during the first 10 days of this month; but with all our mishaps I have no doubt that our returns for September will amount to $20,000. We are lining the mill throughout for the winter, and month and month our expenses are decreasing and out returns increasing. I feel most sanguine about our future. The mine is looking better to day than ever, especially in our lower levels, and we have got everything in first-rate working order. The Union tunnel drift, 250 ft. west of tunnel, is improving; there is a nice streak of mineral on the footwall assaying 160 ozs. silver per ton. The lode is well defined, some 2 ft. in width, showing good crevice matter, quartz, and fluor spar throughout. The Union tunnel stope above this drift has not looked nearly so well for the last 10 days; this morning, however, we have some very nice mineral in sight. The stope, which has an 11 fm. back, is one of our principal reserves, and I have every reason to believe it will prove itself to be this winter a most valuable block of ground. The silver ore shaft continues to look exceedingly well; it is now down 70 feet below the Union tunnel and 7th level. The ore is of fine quality, about 4 in. in width, and the lode is well defined. There is no change to report in the Silver Ore tunnel; the breast continues hard. No. 1 stope, 8th level, looks fairly well; about 3 in. of good average mineral, and a strong lode; ground breaks well. No. 2 stope, 8th level, looks exceedingly well; 6 in. solid mineral. We are taking out from this stope alone from $200 to $300 a-day. The breast of the 8th level is now looking very well, and a nice streak of mineral on both walls; the lode is strong and well defined. At the bottom of the Silver Ore shaft, 150 ft. west, or thereabouts, of this point, we have such splendid mineral that it makes it now as near a certainty as anything underground can well be that we shall have in this block of ground from No. 2 winze to the shaft a stope as good in all respects as No. 2 stope now is. We have now got the drift in the Brown Mine from the Bishop winze in the 91 ft. west, and have started stoping. We have already got a nice streak of mineral in the stope; there is a back throughout of 8 fms. and we expect good returns next month from the block. The mill (dressing works) is working generally well. The hydraulic power is acting splendidly, saving about $30 a-day expense of running on steam-power.

OREGON.—F. Ennis, Sept. 25: I enclose weekly reports for weeks ending Aug. 31, Sept. 7 and 14. The drifts on Thoss claim was run 120 ft. from the face of bank; sunk 14 ft. at back end without finding bed rock. The water came in so fast that we could not get deeper. Found gold in one half the pans washed. Think it advisable to do further washing in this claim during the coming season. Are blasting down cuts at the Reed, putting in sluices, &c. I shall go to Galici on Oct. 1.

RICHMOND.—R. Rickard, Sept. 25: Since my last there is no material change in the mine, and all the explorations are being pushed on as fast as possible. The winze below the No. 7 chamber has been sunk 11 ft., and will be connected with the 500 cross-cut in a few days. The north drift from the incline has not been extended any further than it was last reported. A winze has been started from the end and has been sunk 14 ft. 6 in, in very fair ore. This winze we intend to sink to connect with the 600 fm. level. The drifting of the south drift from the incline has also been suspended, and a winze started 15 ft. back from the end; it is now down 19 ft. 6 in., the first 10 ft. of which was in good ore, and the remainder in low grade. All the different drifts and winzes are without any change since my last. Good progress is being made with the erection of the air-compressing machinery, and if nothing unforeseen happens we shall be able to start it some time next week, when we shall be able to make better progress with the exploratory works. The furnaces are being repaired and machinery overhauled as fast as possible, and I hope to get them ready in about 15 or 20 days.

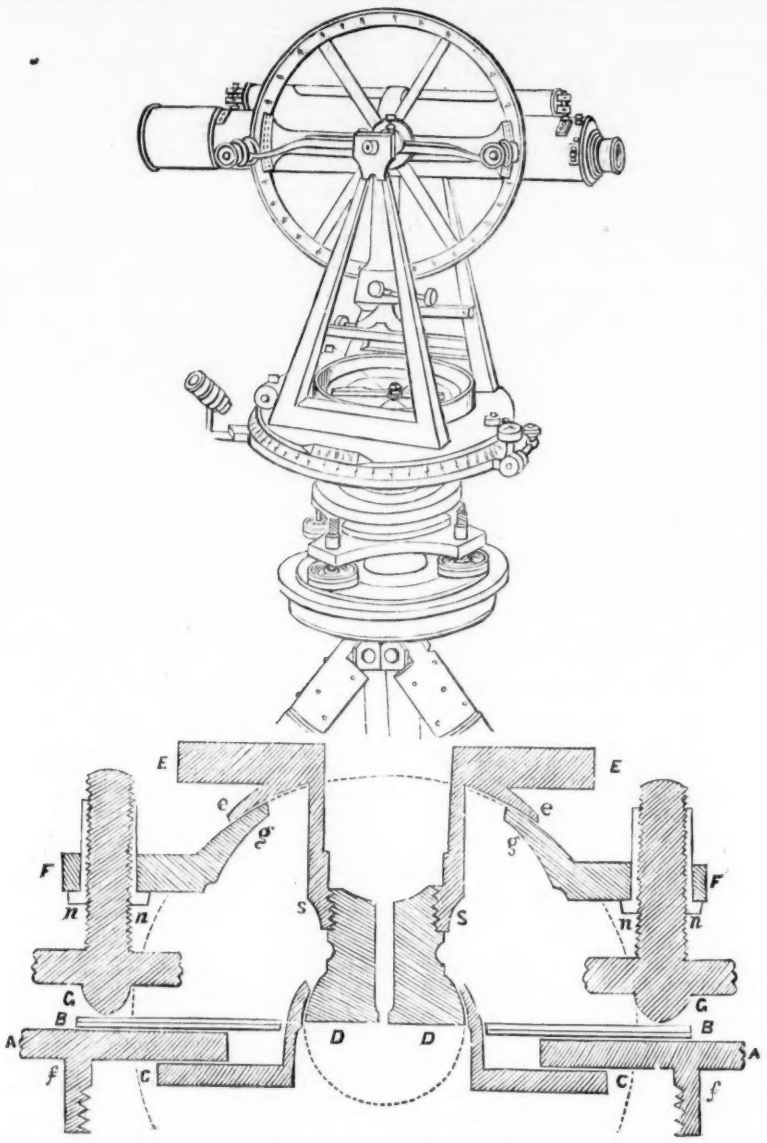
MINERAL HILL.—Mr. Plummer, Sept. 17: Exploratory Work: Since my last we have resumed the driving south of Troy winze; the ground is unchanged—quartz and spar, but no ore. I am now making arrangements for trying our chance in the piece of ground lying between Clarke's working" and the southern boundary of the Francis claim. This I think will be the wisest course we can adopt. Our exploratory work was suspended in the Troy winze on account of bad air, and in the Francis mine because the men were required to assist in the Star Chamber in getting the ore brought to the mouth of the tunnel.—Atwood Mill: During the past week we have had varied success with our operations. For several days after we had started the movements of the various parts of the machinery (especially the battery) were not steady, and the jarring broke several pieces of castings, which we have had to replace. Everything at present, however, is working fairly, and our only drawback is the scarcity of water. We have been obliged to reduce the number of our pans by two, and if the drought continues we shall be obliged to make a further reduction before the run is completed. Yesterday we shipped a bar of bullion per Wells, Fargo, and Co. to the Bank of California on account of the company. It weighed 1485 ozs., was 988 fine, and its value is $1897·83 standard. In a few days we hope to ship another of the same value. We have not as yet commenced on the lease ore (or tributers), as we wished to have everything in good order before touching any high grades.

— Sept. 23: The mill and all connected with it is working well, and the ore is working closer than at first, although I think the company's ore is a little overestimated. We commenced milling the tributers' ore on Saturday, the 21st inst. inst. To night we ship a bar (No. 2) of bullion to San Francisco, weighing 1925 ozs., 969 silver fine, 2·25 gold fine, and valued at $2501·21, less discount.

For remainder of Foreign Mines, see to-day's Journal.]

EXPERIMENT WITH A NEW LAMP.—An interesting experiment was made lately in testing the illuminating power of a double-wick anucapnic lamp, recently patented by Messrs. Thomas Rowatt and Sons, at their works, Fountainbridge, in the presence of a number of scientific gentlemen, among whom were Dr. Stevenson Macadam, Mr. J. Falconer King, city analyst; Mr. Jas. Bryson, Princes-street; and several others connected with the trade. As tested by the photometer, under the inspection of scientific men thoroughly conversant with the process, the lamp showed an illuminating power of fully 35 candle-light, consuming 2¾ oz. per hour by weight and 2·75 by measurement, which is equal to an eighth of a gallon of petroleum for six hours, or a cost of 1½d. for 35 candle-light for six hours. Mr. King stated that Edinburgh gas averaged about 28 candle-light, but many other cities, such as London, average from 12 to 15 candle-light, so that petroleum was a cheaper light.—*Daily Review.*

THE HOFFMAN PATENT TRIPOD HEAD.



FACILITATING ACCURATE SURVEYS.

THE HOFFMAN PATENT TRIPOD HEAD.

Some interesting particulars relating to a new tripod for instantaneously setting and levelling up field instruments were given in a paper read at the Philadelphia meeting of the American Institute of Mining Engineers, a few months since, by Mr. John H. Harden, adjunct professor of mining engineering, &c., in the University of Pennsylvania, and there can be no doubt that the instrument described will be of considerable importance to civil engineers, surveyors, and others similarly engaged. Prof. Harden stated that when the present transit instrument superseded the surveyor's sight compass one special objection that the old land and mine surveyors brought against the transit, and with some show of reason in their argument, was that the tripod of the old compass, with its ball and socket motion, allowed a quicker levelling up of the instrument (and, consequently, more field work) than was possible with the comparatively tedious operation of levelling the transit with its four vertical screws. Ever since the introduction of the transit efforts have been constantly made to give it the same facility of levelling possessed by the surveyor's compass, and the same means were tried—a ball and socket motion, as a modification of this in some form was the only method that would answer. The upper part of a transit is, however, heavier than the corresponding parts of a compass, and as the ball had to be bound tightly enough to keep the instrument in any position, it was necessary in order to overcome this friction to bring too much strain to bear on the transit plates—in some cases the strain was enough to bend them. It had long been the dream with instrument makers to combine the facility of these two tripods—that is, the quickness of the ball and socket with the accuracy and steadiness of the parallel plate with its four vertical screws—but none had succeeded.

There is, however, as Prof. Harden remarks, some show of reason for the desire for a tripod that can be more easily manipulated than the present form, for it rarely happens (outside of the large cities) that the engineer has smooth level ground, as rough and rocky places are the rule, and level ground the exception. This is especially true in railroad and mining surveying, where, too frequently, steep pitches and mountainous sides are found, and places where it is difficult to set an instrument, and stepping around impossible. The present form of tripod head has a number of defects which have been heretofore borne with, simply because no method has as yet been found to overcome them. If it be remembered that almost two-thirds of the time occupied in field operations is employed in setting and levelling up instruments (the remaining third being ample for the mere turning of the angle or the taking of the back and fore sight), and also that during this setting and levelling up the other assistants (axe-men, chain-carriers, and rod-men) are generally idle, it will be seen that every change that facilitates the speed with which field operations can be performed is no trivial matter. In running over rough places, up and down steep and high mountains—in levelling where the level has to be moved and set again at about every 25 ft.—the above estimate of two-thirds of the time is not too great.

In enumerating the defects of the common tripod he refers prominently to the inconveniences encountered in levelling up, observing the distaste for this operation is not confined to those who survey above ground, as every mine surveyor of any experience can recall instances of how in the running up and down slopes, shafts, airways, and breasts—where, try his best, his tripod could not be set level—his instrument would lean considerably, and this screwing and unscrewing of the levelling screws must be gone through with, sometimes with the gentle stimulus of a continuous stream of water pouring down the nape of his neck; and it may not be amiss to name some other difficulties that all of us may have come across without perhaps being able to satisfactorily account for. For example, engineers know that it is almost impossible to level up a good sensitive level so that it will remain perfectly level long enough to take a satisfactory sight—that is, after setting the level in the centre of its run, sighting, and getting the rod-man to move the target, then on taking a second look at the bubble it is almost invariably found to be changed; it is then necessary to touch the levelling screws again, direct the rod-man to move his target, and repeat this operation two or three times before one can feel satisfied that all is right. These aberrations are generally thought to happen from the springing of the plates by forcing the levelling screws too tight. Investigation, however, has proved that in a majority of cases there is one common cause, this cause—the springing of the levelling screws themselves. These screws when moved to a considerable extent do not stand perpendicular to the lower plate on which they are supported, but stand, as it were, on an inclined plane. On turning the screws their ends work on the lower plate like rollers, and slide themselves down this inclined plane; in this state they spring considerably, and any turning of the screws binds them in their nuts or bends the screws themselves.

Taking all these circumstances into consideration, Mr. Daniel Hoffman, a mining engineer of upwards of 36 years experience, and a member of the American Institute of Mining Engineers, has invented an entirely new form of tripod head, and Messrs. John Davis and Son, the well-known instrument makers, of All Saint's Works, Derby, have acquired the exclusive right of manufacture for England, France, and Belgium, and are now about to introduce it into those countries. It consists of a combination of a ball and socket joint and parallel plates; while retaining the play of the former and the firmness of the latter, the improved tripod head is no heavier than the present form of parallel plates, nor does it make the instrument higher or more cumbersome. It is applicable to theodolites, dials, levels, and astronomical transits, and can be adapted to existing instruments at a small cost. Professor Harden observed that it has been well said "that a field instrument ought to be so made that all the manipulations required would be performed mechanically, as it were, so that the observer's attention could almost exclusively be given to the details of the work required of him." Keeping this end in view, any change whatever in the present form of tripod, in order to be acceptable, should possess—first, all the advantages of the present form; second, be so simple in its construction as to require no more manipulation nor brain-work to use; third, must not be liable to get out of order; and lastly (in order to give it the greatest application), in such a shape as to be applied to any or all of the present makes of field instruments at a small cost; so that the new tripod would seem to fulfil all the requirements.

The novel features in Mr. Hoffman's tripod head, as compared with the present styles, are—first, a saving of two-thirds of the time at present necessary in field operations, this saving arising from an increased facility of setting and levelling up, as the instrument can be set up and approximately levelled in an instant without the use of the levelling screws, less than half a turn of the levelling screws is then sufficient to bring the instrument precisely level, the levelling screws always stand perpendicular, the levelling screws are shorter and steadier, the instrument is no higher from the tripod head than at present, nor is it heavier. The shifting head for plumbing over a fixed centre is still retained, no extra screws or manipulations whatever are required in the way of clamping or unclamping, as the operation now necessary for bringing the plummet over the fixed point also answers for the approximate levelling, and when finally levelled up the centre of the cross-wires of telescope, the centres around which the instrument turns, the point of the plummet, and the point over which the instrument has been placed will form a perfectly vertical line, and this vertical line will always remain over the fixed point below the plummet if the instrument be turned on its centre to lay off horizontal angles. The above illustration shows a cross-section through the centre of the new tripod head. The plate, AA, shifting-plate, CC (to bring the plummet over a point), the half-ball, DD, and the levelling screws, GG, are common to all first-class transits. It will be observed, however, that besides the ordinary half-ball, DD, moved by the levelling screws, GG, there is an extra plate, FF, in which the nuts, *nn*, that carry the levelling screws are placed; the upper part of this plate, FF, is also a half-ball, *gg*. This extra plate, FF, always remains horizontal no matter how much the instrument attached to the plate, EE, may require to be turned on its ball *gg*, in order to make the levels stand level. On the upper part of the plate, EE, of which the small half-ball, DD, forms a part, there is a cup or socket, *ee*, that slides over and on the large half-ball, *gg*. These two half-balls, DD and *gg*, are almost 2 in. apart, and of unequal diameter, the upper one, *gg*, having three times the surface of the lower one, DD, and are perfect half-balls; and as on the truth of these half-balls the smoothness of the motion depends special machinery has been devised to make them at one and the same time to insure their absolute coincidence. This accuracy refers merely to the smoothness of working, as all the centres of the transit proper, and on which its accuracy depends, are separate from this portion.

The mode of using the instrument will be so obvious to anyone accustomed to the use of others of the same class that a description is unnecessary, but it will be readily understood that the instrument will be much more likely to stand in truth, as the levelling screws always remain perpendicular. If the instrument should happen to be placed in such a position as to stand almost level this approximation may be dispensed with, and the instrument merely levelled by the screws, GG, as usual. It will be observed that the socket, *ee*, and the half-ball, DD, are practically one and the same piece, being also part of plate, EE (the screws, SS, binding them together), and move in unison—but that the diameter of the upper half-ball, *ee*, is at least three times that of the half-ball, DD; this difference in the sizes of the half-balls is a point that gives practical value to the invention in this manner—that when the levelling screws, GG, are tightened to clamp the shifting plate, C, and the two half-balls, *e* and D, by reason of its greater surface the large half-ball, *e*, is clamped tighter than the lower one, D, and therefore, when the levelling screws, G, are used to level the instrument accurately, the entire instrument turns about the small half-ball, D, while the large upper one, *e*, remains tightly clamped as if it had no existence, and it is only when the levelling screws, GG, are slackened that the instrument can be moved on the upper large ball, *gg*. Some experiments have been made as to the relative speed with which on moderately uneven ground a transit could be set up with this improvement as compared with the old style (the test being—taking the transits up, carrying a number of feet, setting the plummet accurately over a point, accurately levelling up and sighting). It was found that with the new tripod five settings could be made in the same time that one was in progress with the old, as a few seconds only were necessary each time; enough was shown to prove that considerably more field work could be done with the new style, and at the same time easier and more accurately. To railroad and mining engineers this saving of time will be of vast importance, as it will enable them to get through a much larger quantity of work in a given time.

DIRECT ACTION PUMPING ENGINE.*

Messrs. Farcot and Sons have recently completed the construction of the second direct-action pumping engine on a new system, for the Paris waterworks at St. Maur. The engine and pump are horizontal, on one piston-rod, with a fly-wheel movement at one end. The principal novelty consists in the form of the pump and plunger. There are two pumps, in line, worked by one plunger, which reciprocates between them. The body of each pump is considerably larger in diameter than the plunger, of elliptical section longitudinally, so that the greatest enlargement is at the middle of its length. The water thus held in reserve flows in laterally to occupy the void created by the plunger, at a comparatively low velocity, and with comparative facility, in regard to the movement of water required to follow up the plunger of an ordinary close-fitting pump. A higher speed of piston is thus permissible for working without shocks. To afford still more facility of movement the ends of the double-ended plunger, instead of being square, are tapered conically, or, still better, formed with a wave-line taper, which is better either for piercing the body of water in the pump for the in-stroke, or for retiring through it for the out-stroke. With such facilities for rapid motion, the regular speed of the pump and engine amounts, at 30 double-strokes per minute, to 354 ft. per minute. The total length of the pieces in reciprocation is more than 65 ft.; the volume of water lifted amounts to from 360 to 380 cubic feet, or about 2300 gallons per minute, under a pressure of from eight to ten atmospheres.

The pump-valves are hinged, and their action is adjusted by means of india-rubber springs of tubular form, the pressure of which is regulated by set-screws and nuts. An air-vessel is placed above each set of delivery-valves.

The engine is of the Corliss type; the valves are so closely adjusted that the total clearance at each end of the cylinder is not so much as 1 per cent. The cylinder is jacketed with steam direct from the boiler. The steam may be cut off at from 0 to 80 per cent. of the stroke. The fuel consumed varies from 1·984 lb. to 2·095 lbs. per horse-power of duty, in water lifted; corresponding to 1·764 lb. per horse-power at the fly-wheel shaft, and to 1·543 lb. per horse-power indicated. These are the results of performances observed under the direction of the municipal engineers.

— By J. Farcot: Annales industrielles, April 28 and May 12, 1878.

* From James Forrest's "Abstracts of Papers in Foreign Transactions and Periodicals," for the Proceedings of the Institution of Civil Engineers.

PRODUCING ELECTRIC LIGHT.

In the production of the electric light by means of lamps of the Serrin class, one source of inconvenience has been the difficulty of securing uniformity in the composition of the pencils, and Mr. T. F. Scott, of Birmingham, has now invented a method of making them in every respect reliable. He takes finely powdered gas retort carbon, or well-burned coke or other carbon possessing good electrical conducting power, and thoroughly incorporates the material with thin flour paste or thin starch paste, so as to produce a plastic mass, having a consistency suitable for moulding by dies and pressure. The mass is fashioned by any suitable means. Where it is wished that the articles should be clay or other mineral material, such material is finely powdered and thoroughly mixed with the powdered carbon before the admixture of the latter with the flour or starch paste. The articles thus produced may be coated with copper, applied as copper bronze or deposited by electricity, or may be coated with plumbago, the said coatings having for their object to make the articles better conductors of electricity. The invention consists, secondly, in manufacturing flexible bands, ribbons, or cords of carbon (or mixtures consisting essentially of carbon), to be used in the production of light by electricity. He takes the carbon or carbon mixture and incorporates therewith fibres of asbestos or fibres of hemp, or other mineral or organic fibres, together with adhesive matter. By rolling or otherwise he forms the mixture into long bands, strips, or ribbons, and dries them by heat.

Where flexible bands are employed, he mounts two metallic rollers on axes, by preference, slightly inclined to one another. Over these rollers the bands are slowly passed by giving a slow rotation to the rollers. The electricity passes from the rollers to the carbons and across the space between their nearest points. By the slow renewal of the carbon in the path of the current great steadiness and uniformity are obtained in the light produced. The flexible bands may either be endless bands or bands unconnected at their ends. The bands may be used several times, the portions which have passed out of use being made to approach each other before they are again brought into use. The hollow carbon cylinders described are used by being mounted on rollers with their axes slightly inclined to one another. The electricity passes between the parts of the edges of the two hollow carbon cylinders which approach nearest each other, these points being slowly changed by the rotation of the hollow cylinders.

The Duty on Pig-Iron.—The British Iron Trade Association has presented a petition to the Minister of Finance at Brussels, praying for the abolition of the duty of 2½d. per cwt. now levied on all pig-iron entering Belgium from Great Britain. The petitioners urge, among other considerations, that a remission of the duty would be attended with greater advantage to Belgium than its continuance. "It would be certain," they say, "to develope a larger trade between England and Belgium, and by enabling Belgian ironfounders, forgemasters, and engineers to purchase their crude iron more advantageously, it would enable them to distribute their products, over a wider area. It would, moreover, benefit Belgium by affording employment to a large number of hands in the Belgian Mills and forges occupied in converting the crude iron into manufactured products."

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MECHANICAL VENTILATION OF MINES.

THE UNION ENGINEERING COMPANY (C. SCHIELE AND CO.) undertake the Construction and Erection of their Colliery Ventilation Fans, of all sizes up to the largest required quantities of air. The leading features of their system are now generally known. Some of the specialities are: The absence of necessity for costly erections in masonry and brickwork: the small space required for the Machines, and the moderate first cost of the whole.

As the Fans are in a great measure self-contained, the necessary seats and connection with Pit are of a simple and inexpensive character. They can be arranged to be placed below ground when required, and also to work on Drawing Shafts. Certain sizes are often used to assist in Furnaces, with good effect.

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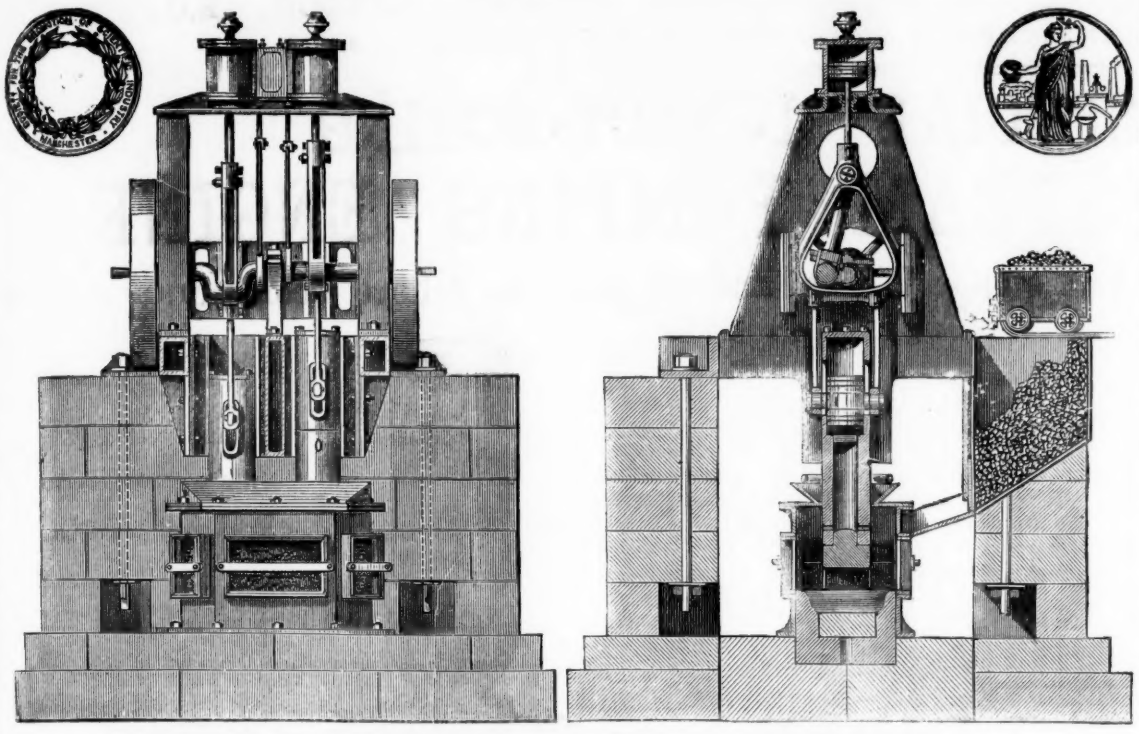

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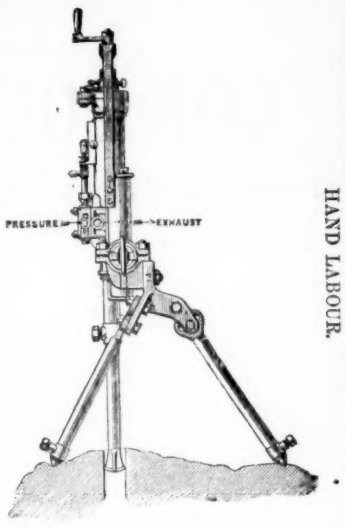

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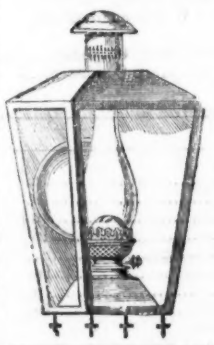

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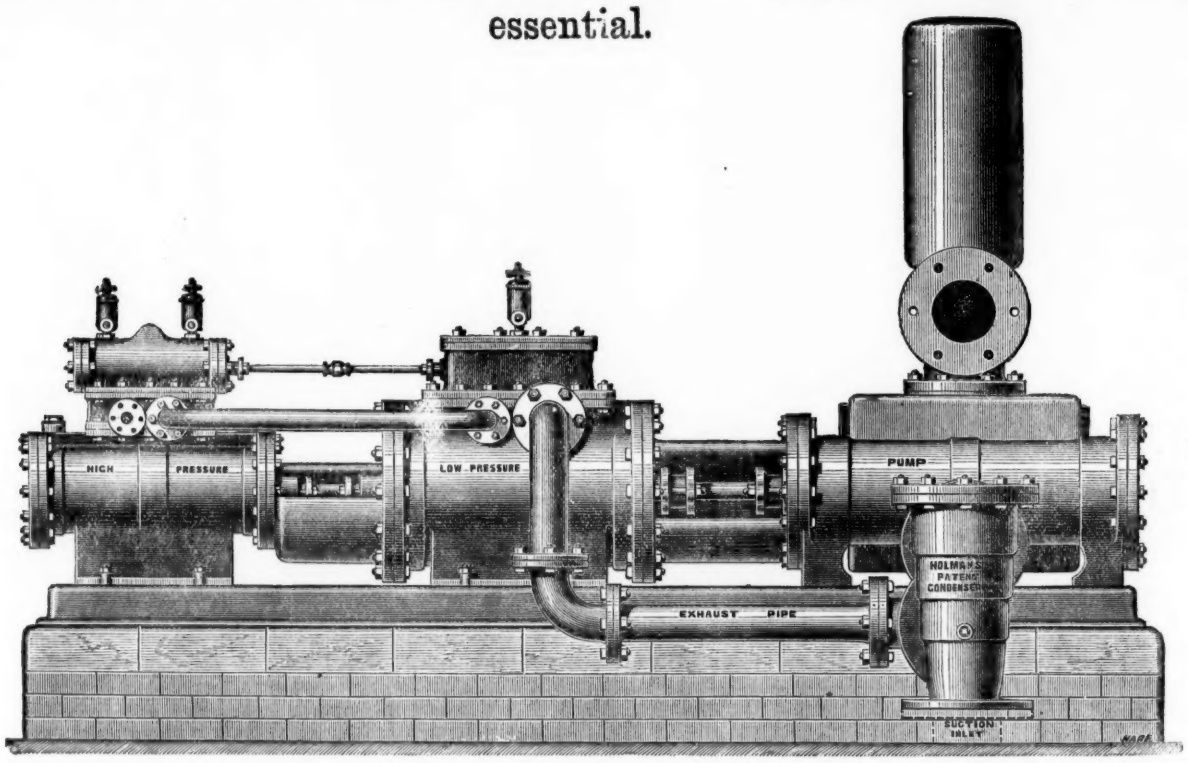
THE "SPECIAL" DIRECT-ACTING COMPOUND STEAM PUMPING ENGINE

For use in Mines, Water Works, Sewage Works, and all purposes where Economy of Fuel is essential.



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The illustration shows an extension of the principle of this Pump to a Compound Steam Pumping Engine, by which the economical advantages resulting from the expansion and condensation of steam are very simply and effectively obtained. The steam after leaving the high-pressure cylinder is received into and expanded in the low-pressure cylinder, and is thus used twice over before being exhausted into the condenser or atmosphere. The Engine combines simplicity, certainty of action, great compactness, fewness of parts, and consequent reduction in wear and tear.

Several thousands of the "Special" Steam Pumping Engines, with high-pressure cylinders only, are in use in British and Foreign Mines, Water Works, &c.,—and for confined situations, or where Engines of a comparatively small size only are necessary, they will still meet all requirements—but their application will be very largely increased, since it has been found practicable to embrace the important features of expanding and condensing the steam, so that increased power may be obtained, and the consumption of fuel greatly economised.

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Diameter of High-pressure Cylinder.....In.	8	8	8	10	10	10	10	12	12	12	12	14	14	14	14
Ditto of Low-pressure Cylinder .....In.	14	14	14	18	18	18	18	21	21	21	21	24	24	24	24
Ditto of Water Cylinder .....In.	4	5	6	5	6	7	8	6	7	8	10	7	8	10	12
Length of stroke .....In.	24	24	24	24	24	24	24	24	24	24	24	36	36	36	36
Gallons per hour approximate	3900	6100	8800	6100	8800	12,000	15,650	8,800	12,000	15,650	24,450	12,000	15,650	24,450	35,225
Diameter Suction and Delivery .....In.	3	3½	4	3½	4	5	6	4	5	6	8	5	6	8	9
Diameter High-pressure Steam Inlet.....In.	1¼	1¼	1¼	1½	1½	1½	1½	2¼	2¼	2¼	2¼	2½	2½	2½	2½
Diameter Low-pressure Steam Exhaust.....In.	1½	1½	1½	1¾	1¾	1¾	1¾	2½	2½	2½	2½	2½	2½	2½	2½
Height in feet water can be raised with 40 lbs. pressure per square inch in cylinder ..... Non-condensing...	360	330	160	360	250	184	140	360	264	202	130	360	275	175	122
Ditto ditto ditto—with Holman's Condenser...	480	307	213	480	333	245	187	480	352	269	173	480	367	234	163
Ditto ditto ditto—with Air-pump Condenser...	600	384	267	600	417	306	335	600	440	337	216	600	459	203	203

CONTINUED.

Diameter of High-pressure Cylinder .....In.	16	16	16	16	18	18	18	18	21	21	21	24	24	24	30
Ditto of Low-pressure Cylinder .....In.	28	28	28	28	32	32	32	32	36	36	36	42	42	42	52
Ditto of Water Cylinder .....In.	8	10	12	14	8	10	12	14	10	12	14	10	12	14	18
Length of stroke .....In.	36	36	36	36	48	48	48	48	48	48	48	48	48	48	48
Gallons per hour approximate	15,650	24,450	35,225	47,950	13,650	24,450	35,225	47,950	24,450	35,225	47,950	24,450	35,225	47,050	35,225
Diameter Suction and Delivery .....In.	6	8	9	10	6	8	9	10	8	9	10	8	9	10	9
Diameter High-pressure Steam Inlet .....In.	2½	2½	2½	2½	3	3	3	3	3½	3½	3½	4	4	4	5½
Diameter Low-pressure Steam Exhaust.....In.	3	2	3	3	3½	3½	3½	3½	4	4	4	5	5	5	6½
Height in feet water can be raised with 40 lbs. pressure per square inch in cylinder ..... Non-condensing..	360	230	160	118	456	292	202	149	397	276	202	518	360	264	562
Ditto ditto ditto—with Holman's Condenser...	480	307	213	154	603	389	269	198	528	363	269	691	480	352	750
Ditto ditto ditto—with Air-pump Condenser...	600	384	267	191	750	486	337	248	660	450	337	864	600	440	937

PRICES GIVEN ON RECEIPT OF REQUIREMENTS.

Any number of these Engines can be placed side by side, to work in conjunction or separately as desired, thereby multiplying the work of one Pump to any extent.

NORTH OF ENGLAND HOUSE ... ... TANGYE BROTHERS, ST. NICHOLAS BUILDINGS, NEWCASTLE-ON-TYNE.
SOUTH WALES HOUSE... ... ... TANGYE BROTHERS AND STEEL, Tredegar Place, NEWPORT, Mon.; and Exchange Buildings, SWANSEA

AWARDED THE PRIZE MEDALS AT LEEDS, MANCHESTER, AND WREXHAM EXHIBITIONS, 1875 AND 1876.

HADFIELD'S STEEL FOUNDRY COMPANY,

ATTERCLIFFE, SHEFFIELD,

DEVOTE THEIR EXCLUSIVE ATTENTION TO THE MANUFACTURE OF

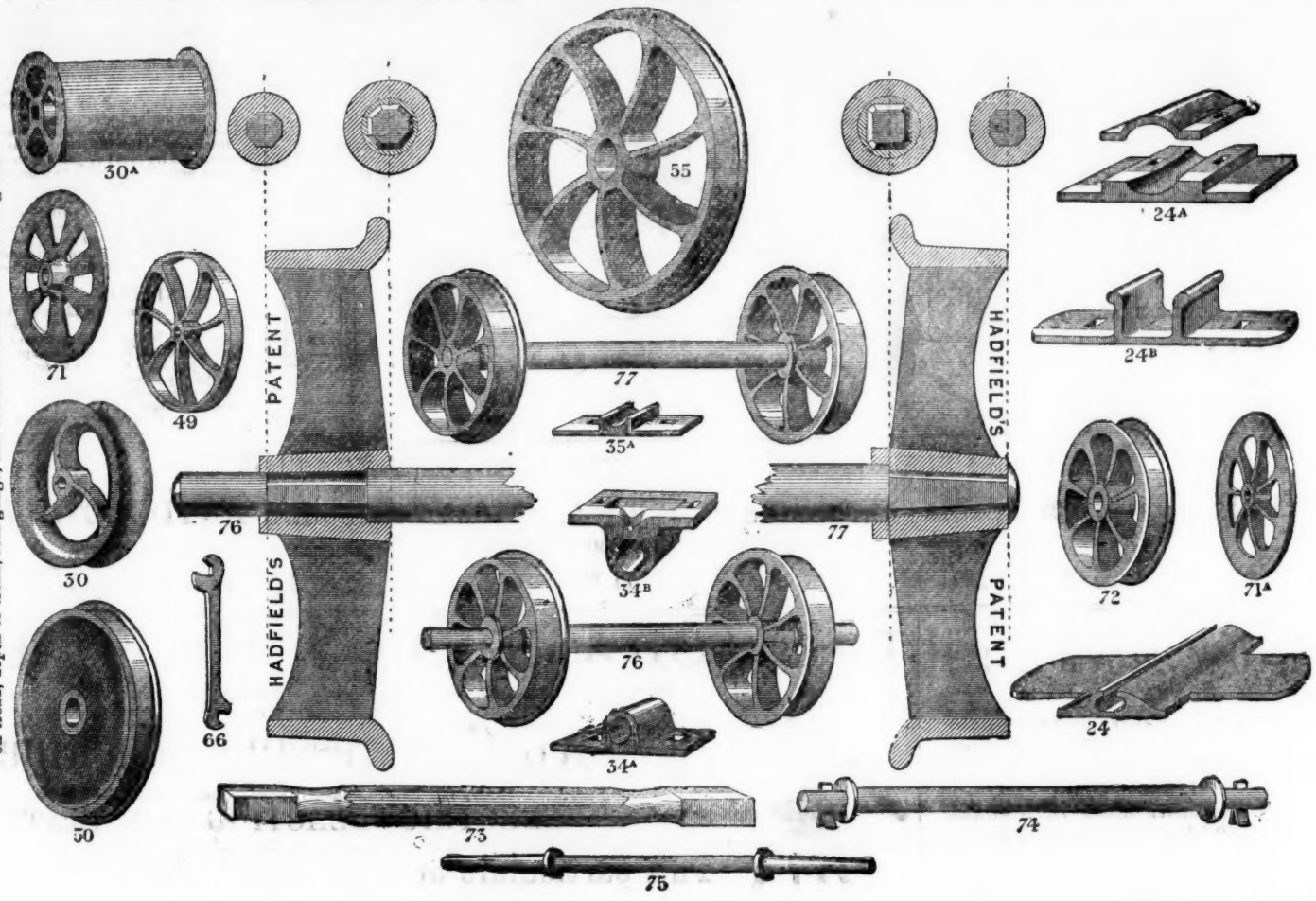
CRUCIBLE STEEL CASTINGS, for Engineering and Mining Purposes,

AND ARE THE SOLE MAKERS OF

HADFIELD'S CRUCIBLE STEEL WHEELS.

One of our departments is specially adapted for the manufacture of these Wheels (as shown below), for Collieries, Ironstone Mines, Slate Quarries, Ironworks, Lead Mines, &c., &c. We have made, and are now making, many HUNDRED THOUSANDS; and having Patented a New Method of Fitting Wheels upon axles, being cheap, effective, and expeditious, we can execute orders entrusted to us with promptitude, our capacity in this department alone being equal to about 2000 wheels per week.

N.B.—Prices per Set of Wheels and Axles, fitted complete, forwarded on receipt of diameter of wheel on tread, depth of tread, real gauge, and thickness of axles and rolling load.



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HADFIELD'S PATENT METHOD OF FITTING WHEELS UPON AXLES.

The advantages of the above system are that the Wheels being forced upon a Taper Square-ended Axle, by Machinery, and then riveted (the machine securing truth), it is impossible that they can come loose or get within gauge. They are very heaply fitted on, and run exceedingly true.

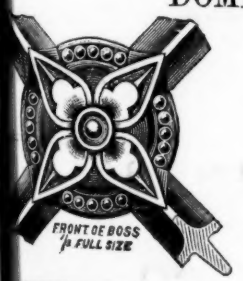
We construct the Arms of wheels upon the curved principle (as shown in the drawings above), consequently the shrinkage or cooling of the Castings is not interfered with, thus securing the greatest advantages of our very strong material.

CRUCIBLE CAST-STEEL WHEELS, when cast by us, are made from one-third to one-half lighter than Cast-Iron. They cannot be broken while working, even with rough usage, and will wear at least twelve times as long as Cast-Iron, thus saving animal and steam power, and reducing wear and tear immensely.

We would also draw special attention to our INCLINE PULLEYS and CAGE GUIDES, the adoption of which will prove highly advantageous.

HARRIS'S PATENT WROUGHT-IRON WINDOWS.

DOME AND OTHER ROOF LIGHTS, FLOOR AND PAVEMENT LIGHTS, ETC.

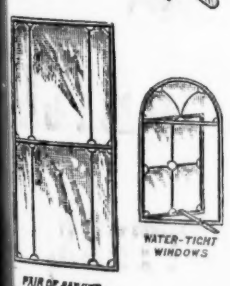


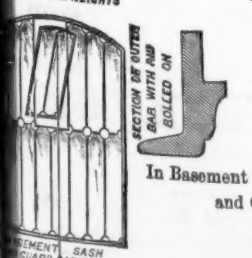
GREAT BRITAIN,
UNITED STATES OF AMERICA,

ARE STRONGER, SUPERIOR, AND CHEAPER THAN ANY OTHER METAL SASHES YET PRODUCED—COST LESS FOR GLAZING—ARE AS CHEAP IN MANY CASES AS WOOD

Private Houses,
Parsonage Houses,
Farm Houses,
Churches,
Chapels,
Schools,

ILLUSTRATED CATALOGUES ON APPLICATION.

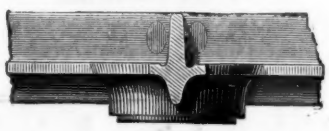


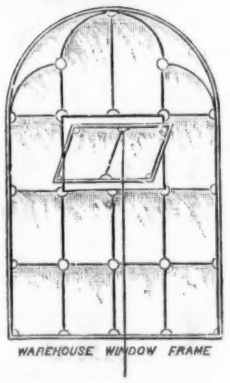


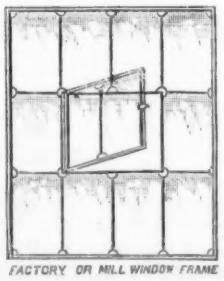
In Basement Storeys and Exposed Positions Shutters and Guard Bars are dispensed with.

HOME AND

PATENTED IN







FRANCE,
GERMANY, AND BELGIUM.

—CAN BE DESIGNED AND MANUFACTURED TO SUIT ANY STYLE OF ARCHITECTURE OR POSITION WHERE A WINDOW MAY BE REQUIRED.

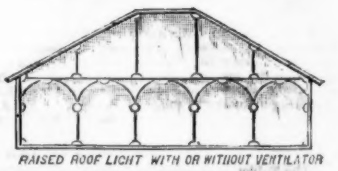
ARE BEING EXTENSIVELY USED IN—

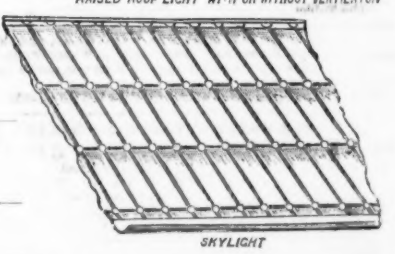
Lunatic Asylums, &c.,
Public Buildings, Banks,
Wharves, Warehouses,
Factories, Mills,
Breweries, &c.,
Engine Houses.

ILLUSTRATED CATALOGUES ON APPLICATION.

Security is obtained in these Skylights without Guard Bars, and with less obstruction to Light.

EXPORT.





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SAFE, STRONG ROOM, AND PARTY WALL DOORS, AND EVERY KIND OF CONSTRUCTIONAL AND BUILDERS' IRONWORK, LIFTS, HOISTS, ELECTRIC BELLS AND TELEGRAPHS, &c.

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At the **PARIS EXHIBITION** the Jurors have Awarded

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FOR MY LATEST PATENTED STONE BREAKERS AND ORE CRUSHERS.

Stones broken equal, and Ores better, than by hand, at one-tenth the cost.

H. R. MARSDEN,

ORIGINAL PATENTEE AND SOLE MAKER OF **BLAKE'S**

Improved Patent Stone Breakers & Ore Crushers.

New Patent Reversible Jaws, in Sections, with Patent Faced Backs.

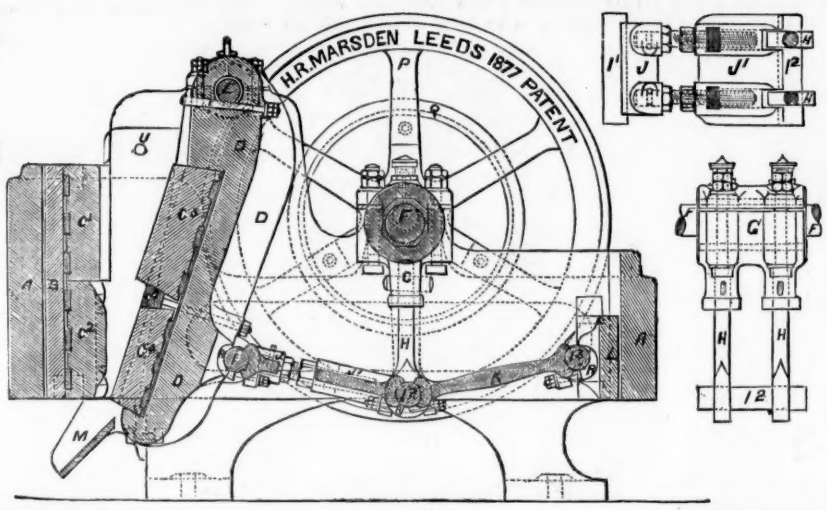
NEW PATENT ADJUSTABLE TOGGLES.

OVER **2500** IN USE.

New Patent Draw-back Motion.

NEW PATENT STEEL TOGGLE BEARINGS.

70 PRIZE MEDALS.



READ THIS—

Wharthole Lime Works, Maryport, Whitehaven, November 7, 1873.

H. E. MARSDEN, Esq., Soho Foundry, Meadow-lane, Lee

DEAR SIR,—The machine I have in use is one of the la size, 24 in. by 12 in. The quantity we are breaking daily w this one machine is 250 tons, the jaw being set to break t size of 2½ in. We have, however, frequently broken o 300 tons per day of ten hours, and on several occasions o 360 tons during the same period. The stone we break is blue mountain limestone, and is used as a flux in the vari ironworks in this district. We have now had this machin daily use for over two years without repairs of any kind, have never had occasion to complain of any inconvenience using the machine. I hope the one you are now making me may do its work equally well. The cost—INCLUDING GINE-POWER, COALS, ENGINEMAN, FEEDING, and all EXPE OF EVERY KIND—is just 3d. per ton. Should any of y friends feel desirous of seeing one of your machines at w I shall have much pleasure in showing the one alluded to.

I am, dear Sir, yours very truly,

WILLIAM MILLE

AND THIS—

Wharthole Lime Works, Aspatria, Cumberlan July 11th, 1878.

H. R. MARSDEN, Esq., Soho Foundry, Leeds.

DEAR SIR,—We are in receipt of your letter of 4th ins may just state that the stone breaker above named has under my personal superintendence since its erection, a have no hesitation in saying that it is as good now as it five years ago.

I am, dear Sir, yours faithfully,

FRANCIS GOUL

GREATLY REDUCED PRICES ON APPLICATION.

ALL BEARINGS are renewable, and made of H.R.M.'s Patent Compound ANTIFRICTION METAL.

CATALOGUES, TESTIMONIALS, &c.

H. R. MARSDEN, SOHO FOUNDRY, LEEDS, ENGLAND.

The Barrow Rock Drill

COMPANY

Are NOW PREPARED to SUPPLY their DRILLS, the ONLY ONES that have been SUCCESSFULLY WORKED in the MINES of CORNWALL. At DOLCOATH MINE, in the HARDEST known ROCK, a SINGLE MACHINE has, since its introduction in July, 1876, driven MORE THAN THREE TIMES the SPEED of HAND LABOUR, and at TWENTY PER CENT. LESS COST PER FATHOM.

In ordinary ends two machines may be worked together, and at a proportionately increased speed. They are strong, light, and simple, easily worked, and adapted for ends and stopes, and the sinking of winzes and shafts.

The company are also prepared to SUPPLY COMPRESSORS, and all necessary appliances for working the said Drills.

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LOAM AND SON,

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IMPROVED STEEL WIRE FOR ROPES.

WEBSTER & HORSFALL,

(ORIGINAL PATENTEES),

MANUFACTURERS OF IMPROVED STEEL WIRE FOR ROPES FOR COLLIERIES,

RAILWAY INCLINES, PLOUGHS, HAWSERS, &c.

SOLE MANUFACTURERS of the HOMOGENEOUS WIRE for the ATLANTIC CABLES of 1865 and 1866.

WEBSTER AND HORSFALL.

BIRMINGHAM.

Second Edition. Just published, price 8s. 6d.

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Comprising a Series of New and Comprehensive Tables, practically arranged to how at one view the Weight of Iron required to produce Boiler-plates, Sheet-iron, and Flat, Square, and Round Bars, as well as Hoop or Strip Iron of any dimensions. To which is added a variety of Tables for the convenience of Merchants, neluding a Russian Table. By JAMES ROSE.

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"The Tables are plainly laid down, and the information desired can be instantaneously obtained."—*Mining Journal.*

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MINE AND QUARRY STANDS, STEEL DRILLS, SPECIALLY PREPARED INDIARUBBER HOSE, TESTED IRON PIPES, &c.

Air-Compressing Machinery,

Simple, strong, and giving most excellent results, and

ELECTRIC BLASTING APPARATUS.

Full particulars of rapid and economical work effected by this machinery, on application.

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THE SCHRAM ROCK-BORING MACHINE

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IS NOW INTRODUCED INTO ENGLAND, AND REFERENCES TO PLACES WHERE IT IS IN OPERATION MAY BE HAD UPON APPLICATION.

The peculiar FEATURES of this MACHINE are, its REMARKABLY SMALL CONSUMPTION of AIR or STEAM, its DURABILITY, and its GREAT PENETRATING POWER.

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PARIS EXHIBITION, 1878.

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Has been awarded to

SALMON, BARNES, AND CO.,

FOR THEIR

PATENT ROANHEAD ROCK DRIL

AND THE HIGHEST AWARD,

A SILVER MEDAL,

FOR

IRON AND WOOD REVOLVING SHUTTERS,

Worked by their PATENT BALANCE-WEIGHT MOTION.

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J. WOOD ASTON AND CO., STOURBRIDGE

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CRANE, INCLINE, AND PIT CHAINS

Also CHAIN CABLES, ANCHORS, and RIGGING CHAINS, IRON and STEEL SHOVELS, SPADES FORKS, ANVILS, VICES, SCYTHES, HAY and CHAFF KNIVES, PICKS, HAMMERS, NAILS, RAILWAY and MINING TOOLS, FRYING PANS, BOWLS, LADLES, &c., &c.

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